Gas Journal

MARCH 31, 1937

Vol. 217 89th Year No. 3854

Editorial Notes

The Domestic Coal Market

THE coal industry, awakening to the progress made by the Gas Industry in the domestic cooking and heating field, is becoming not a little perturbed and is busying itself in endeavouring to organize to avert this progress. We do not envy anyone concerned in this task. Public demand is for cleanliness and convenience. That is why the Gas Industry's two smokeless fuels are going ahead so rapidly, and we cannot envisage the coal interests stemming the tide, though we do realize that we are going to face more opposition. This opposition has, however, come too late in the day to cause us anxiety; it will, we think, merely act as another incentive to get on with our work and perfect our own organization not for selling gas and coke but for selling a thoroughly satisfactory heat service.

These thoughts arise from the recent conference of the Combustion Appliance Makers Association (Solid Fuel), at which, among the reports presented, was one on the domestic market for solid fuel, by which was meant the market for house coal. It is a report analyzing the present position and recommending reform. At the outset the importance to the coal industry of the domestic market is stressed, as also is the lack of definite knowledge as to its position and tendencies. This, of course, is true. Only a week or two ago we emphasized, not for the first time, that the Gas Industry needs a great deal more quantitative information of what is taking place in the domestic heating field, a surer knowledge of how the changing habits of the people and the sway of public opinion will influence the future sales of gas and coke. It is estimated in the report that the consumption of coal for domestic heating and cooking is 20 to 25 million tons per annum, and not the oft-quoted 40 million tons, which, in fact, includes uses other than domestic. In any case, 25 million tons or so is no small quantity, and not unnaturally the coal interests do not look kindly to its replacement by gas derived, it is asserted, from "cheap" coal. The higher standards of domestic comfort, however, demand in increasing measure gas and coke. There is a momentum of public opinion in favour of labour saving and convenient appliances for domestic heating and cooking and we cannot visualize a reversion to the burning of raw coal by those who have experienced gas. In this connection we would mention that in many mining districts gas cookers are installed in spite of the fact that miners get free coal allowances; and if the Combustion Appliance Makers Association sets store by the statement in the report under review that the disadvantages of a coal fired cooker are "largely compensated by the improved flavour of dishes" it will not go very far in displacing gas. We seem to have heard that one before, from quite a different quarter.

The report puts forward healthiness as one of the advantages of burning raw coal. In view of the smoke produced from domestic firegrates—smoke which shuts out the ultra violet rays from the sun and creates, besides filth, a mental gloom which must have an adverse physical reaction, this is a surprising claim. We agree that the ventilating effect of the coal fire is useful in promoting healthy conditions. This ventilating effect, however, is obtained by the use of the gas fire, and in a much more controllable manner. Another advantage claimed for the coal fire is that it keeps the walls of a house dry during the winter. This heating of the chimney flue is admittedly useful, and a certain amount of chimney heating takes place with a gas fire. How much better, however, is what we have termed in these columns "background heating" supplemented by radiant heat. Gas free from sulphur would be ideal for this "background heating"—labourless heating under exact control.

Service deficiencies in the coal trade are dealt with in the report and a comparison is made between the installation of a gas cooker and a coal fired range. A telephone message to the gas undertaking sets in motion machinery which, "unless checked"—we quote from the report—brings about the installation of a gas cooker without further initiative on the part of the householder; no heavy capital outlay is involved; there is no danger that the appliance will be unsuitable for the gas supply; and expert advice is available at any time of the day or night. Quite, it is just part of gas service, and it is very different from the trouble of obtaining, installing, and operating a coal fired range. It is unthinkable, however, assuming that equal facilities existed for the installation of coal fired ranges, that the public would be interested in them. Coal cooking is not the cooking either of the present or the future. "It is safe to say," states the report, "that the extra trouble involved in buying a solid fuel burning appliance as compared with one for the use of gas or electricity results, tens of thousands of times a

year, in an initial decision to use solid fuel being transformed into a final acceptance of some less troublesome alternative." As a matter of fact, millions of gas appliances are being installed yearly, but the initial decision is to use gas. When considering new cooking appliances the public's thoughts do not turn to raw coal.

The report points to the co-operation which exists in the Gas Industry between the producers of gas and the makers of appliances—co-operation which has rendered possible the rapid progress in design. Coal producers and distributors take no active part in advancing the progress of design. Yet, it is argued, a fraction of 1% on the turnover of domestic coal sales would suffice to establish and maintain a research organization which could rapidly make up the ground which has been lost as compared with appliances using other sources of heat. The development of the gas cooking, heating, and water heating load, has been due to the fact that gas is a clean, economical, and naturally controllable heat agent requiring no labour whatsoever. The modern housewife will have no desire to revert to the use of raw coal and all the labour it entails.

Disposal of Effluents

We have had occasion frequently in the past to refer to the important question of the disposal of trade effluent. The unsatisfactory state of the law has for long been recognized. As things stand at present, industries have the absolute right to drain their effluent into the sewers; the law requires that the local authority should afford them reasonable facilities for so doing, but there are so many " ifs " and " buts " about it that traders are, for all practical purposes, at the mercy of the local authority.

In 1933 a Joint Committee of the Ministry of Health and the Ministry of Agriculture and Fisheries was set up to investigate the matter. This Committee, before which evidence was offered by the Gas Industry, issued an extremely useful Report. The Report recommended, in effect, that an obligation should be placed upon local authorities to receive manufacturers' effluent. It was further pointed out that the matter was one of urgency, and that legislation should be introduced by the Government at an early date. Unfortunately, the usual pressure of Parliamentary business rendered it impossible at the time to introduce the necessary legislation. Realizing the importance of the matter, however, Lord Gainford introduced a Private Member's Bill in the House of Lords last session. This Bill placed upon local authorities an obligation to receive trade effluent, provided the discharge was in accordance with by-laws to be made by the local authority.

The Bill passed all its stages in the House of Lords, but no facilities were afforded for its passage through the House of Commons. Fortunately, the Government have now taken the matter up, and a Bill has been introduced by Viscount Gage, and has passed through its preliminary stages in the House of Lords. Generally speaking, we think that the Bill would be satisfactory to industry, although it differs somewhat from that introduced by Lord Gainford. The Bill provides that manufacturers shall not discharge effluent into sewers without the consent of the local authority, but where the local authority withholds consent the manufacturer may appeal to the Ministry of Health. The Bill provides that before the discharge of effluent notice must be given to the local authority, and that the information contained in the notice must be such as to indicate the nature or composition of the trade effluent, and the maximum quantity and the highest rate of discharge. Every discharge of effluent over a certain amount will be subject to by-laws to be made by the local authority, and these by-laws may, in appropriate cases, contain provisions regarding the payment to be made by traders to the local authority in respect of the discharge. The amount of the payment would naturally have to be determined in each individual case, and such circumstances as any additional expense to be incurred by the local authority would have to be taken into consideration. It does not mean that payment would be exacted in every case, and there would always be the right to appeal to the Ministry of Health.

Great care has been taken by the drafters of the Bill to ensure that none of the provisions of the Bill shall apply to any right already possessed by the trader to discharge effluent into the sewer.

The Radiation Meeting

There are a few outstanding events in the year which give the Gas Industry opportunities of telling an instructed public what a public utility such as gas means to them in service. Like those of the leading gas undertakings, the securities of Radiation Limited are widely esteemed for investment purposes, and the speech of the Chairman at the Annual General Meeting reaches, in one way and another, an extensive audience—an audience, too, which is capable of assessing values at their true worth and exercising an influence which is of vital importance to our Industry.

Mr. H. James Yates, at the Meeting on Wednesday last week, can have disappointed none of his hearers (or readers), whether they regarded his speech from the viewpoint purely of investors, or of producers or consumers of gas, or of more than one of these chief categories. It is perhaps the financial success of the Radiation combine which least receives the recognition it deserves from the rank and file of the Industry it serves. Any grudging of success in this particular direction is a strange and exceedingly short-sighted view to take in these days of continuous striving after prestige values in none too sympathetic a market. We have, indeed, every reason to be devoutly thankful that the combine which Mr. Yates founded shortly after the War has, under his control and guidance, enjoyed an experience so different from that of the vast majority of financial enterprises which were launched in those hectic days. In its progress from strength to strength it has not only maintained much-needed prestige for the Gas Industry, but it has been able to provide funds for research, for publicity, and for other purposes which have benefited the Industry in general, as well as the shareholders' pockets. Those in the Industry who demand cheaper gas appliances directly at the expense of the makers' profits must realize they cannot have it both ways. In our view, often expressed in these columns, they are asking for it in quite the wrong way.

This line of thought leads inevitably to consideration of the fact that so far from any decrease being possible, there has been an increase in the cost of appliances to gas undertakings in the past year. This is a matter which we have discussed on various occasions since Mr. Yates gave a very clear warning on the subject at last year's meeting. As recently as Feb. 3 we reviewed the whole position at some length, with our thoughts in the

direction of how to meet the increased costs, and if possible even to derive benefit from the situation thrust upon us by circumstances entirely outside our control. Others will do well to turn their thoughts in the same direction, without pausing to cry for the moon or any amelioration in the position. It is common knowledge that the appliance makers delayed, at heavy sacrifice to themselves, the increase in selling prices announced at the end of last year. It is clear that the small increase then made cannot have covered the higher costs of labour and material, which in the sum were offset only by considerably increased turnover. Further, as Mr. Yates explained in his speech, they are now faced with further increases in wages, contracts for materials are on a still higher basis, and delivery becomes more and more difficult to obtain.

Much of the remainder of Mr. Yates' speech was devoted to the subject of research, to his faith and success in which Radiation Limited and the Gas Industry owe so much. Forty years ago Mr. Yates installed a research laboratory in the works which were then under his control. Even earlier than that he had possessed a laboratory in his own home. These personal reminiscences were made at the Meeting by Mr. C. Herbert Smith when he presented, on behalf of the Board, an oil painting of Mr. Yates to be hung in the Board Room as a mark of appreciation of his services to the Company. These early symptoms of Mr. Yates' faith in research may be regarded as the embryo of the highly developed organization which Radiation Limited carries to-day. This includes pure research at Radiation House to ensure progressive development in the future; applied research and practical development in Birmingham, where entirely new laboratories built during the past year are claimed with confidence to be the finest and best equipped in the gas appliance industry in this country; and new Research and Demonstration Kitchens in Birmingham, not only for intensive study of dietetics on scientific lines, but for the training of personnel to demonstrate to the public the practical application of such study.

It is clear, then, that Radiation Limited are by no means content to rest upon the laurels they have already won, and that the Gas Industry can safely look forward to additions to the pioneer work to which this great combine can already lay claim.

Road Surface Brightness

We have stated in these columns on more than one occasion that we care nothing for the idea, advanced so assiduously by the electricians, and for obvious reasons, that surface brightness is the sole criterion of good street lighting. False deductions can all too readily be drawn by solely considering the visibility of objects some distance ahead on flat, straight roads. No two thoroughfares have precisely the same requirements, and the lighting installation must be designed having regard to the peculiarities of the particular thoroughfare—bends, cross-roads, nature of background, and undulation and nature of road surface. This question of surface brightness was discussed by Dr. S. English, of the Holophane Research Laboratory, in a Paper given at a meeting this month of the Illuminating Engineering Society; and Dr. English shares our views. The widespread use in the making of modern roads of such materials as tarmacadam and asphalt, which take a fairly good polish after being subjected to heavy motor traffic for some time, has, he said, led to the resurrection of theories of street lighting based on road surface brightness.

Road surface brightness has in some quarters almost been elevated to a creed, being regarded as the one and only characteristic that is worthy of attention; and some of the newer protagonists, observed, Dr. English, do not seem to admit the difficulties it leads to as frankly as the earlier workers on this subject. For instance, the question of glare appears to be completely ignored, though it is obvious that strong beams of light impinging on the eye only a few degrees from the normal line of sight must result in an impairment of vision. Moreover, brightness distribution on a road surface can be completely altered by a simple repair of the surface or even by a shower of rain; and certain lighting fittings give very uniform brightness results on certain roads, and yet in neighbouring installations in which identical fittings are used are far from uniform. "It is," said Dr. English, "no use practising the Nelson touch and turning a blind eye to facts such as these—ignoring the obvious and pretending it does not exist will not solve street lighting problems."

Admittedly road surface brightness is an important factor in assisting silhouette vision and producing brightness contrasts by which obstructions are seen on roadways, but the theory must be applied in practice judiciously and with a full recognition of other factors involved in good street lighting, and also with an appreciation of the varying needs of the different classes of road user. In towns and populous areas where pedestrian traffic is heavy and where the road surface forms a relatively small proportion of the backgrounds against which motor drivers see objects, it seems obvious that a different form of lighting could be adopted with advantage from that which is used for the lighting of motor roads. Dr. English emphasized that the aim of street lighting is not to produce uniform illumination along the roadway, or to produce uniform and high surface brightness, or to eliminate glare, or to produce a constant degree of glare, but simply to enable road users of whatever class to see clearly whatever they need to see. And in any scheme of lighting the pedestrian must be considered as well as the motorist. The pedestrian needs to see people and things generally at a relatively close range, so that the brightness of the road a quarter of a mile away is of no interest to him. It must also be remembered that the motorist needs to see clearly and quickly in the near neighbourhood of his car, for many more accidents occur as the result of pedestrians stepping off pavements immediately in front of a car, or as the result of cyclists coming out of side turnings just as a car reaches them, than are due to the fact that the motorist was not able to see something on the road a quarter of a mile away.

Calcium Carbide Manufacture

It will be within the recollection of our readers that the Caledonian Power Bill has been rejected by Parliament and that, following that rejection, the Government is now taking steps to set up a small committee composed of persons not in Government service to advise how best the country can be provided with a supply of calcium carbide and allied products, and where best the supply can be produced. At first sight there seems to be a wide gap between calcium carbide and the carbonization industries, but in reality there is a certain cousinship. The importance of welding in the manufacture of gas plant and appliances is increasing, and although electric welding, water-gas welding, oxy-coal gas, and other processes are used, the importance of oxy-acetylene welding cannot be denied. Acetylene has, moreover, proved on occasion an illuminant of no mean order,

and has even been used at times to enrich coal gas when difficulties prevented the supply of the normal grade in past years.

A source of carbon must be used in the production of carbide which can be coke, though it is more usually anthracite. This country imported 56,000 tons of carbide last year—and produced none at home. The amount of coke or anthracite needed for carbide manufacture as the essential raw material of the process is not great; we believe it was proposed to produce 100,000 tons per annum in the Corpach factory for which the Caledonian Power scheme was required, and this would involve the use of some 60,000 tons of coke or anthracite. The essentials of the carbonaceous material used for carbide production are hardness and freedom from phosphorous. Most carbide factories in Europe use Welsh anthracite, but hard coke containing 7 to 8% of ash will function perfectly, provided the lime with which it is heated is pure, the term "pure" being satisfied if the lime contains not more than 1½% of magnesia. The hardness of coke enables it to be used in circumstances in which a high ash content would make anthracite impossible. The phosphorous content of the carbon is important because calcium phosphide gives rise to the poisonous gas phosphine in the acetylene. The phosphine content of acetylene must be below 0·05% by volume. Apart from the high ash content, which could be overcome by the use of suitable coals to produce coke specially for the purpose, coke suffers from the drawback of its high moisture content. Admittedly, coke containing less than 1% of water can be produced regularly at coke ovens, and dry quenching plants are available which permit of further reduction; but owing to its porous nature coke takes up water in transit, and we heard of a coke dry when leaving the works which was found to contain no less than 12% of water when it arrived at a carbide works abroad.

Electricity from Water Power

THE importance of the present Caledonian Bill controversy lies in the production of power in this country by water power. It will be remembered that in 1933 the Severn Barrage Committee issued its report in which it was concluded that for a capital expenditure at that date of some £38,000,000 power could be produced at between 0·18d. and 0·237d. per unit, as compared with an average cost by the grid of 0·375d. and a cost at the new Battersea station of 0·3d. These figures are complicated from the industrial angle by the low load factor taken of 34% which the Electrical Grid "hoped will have been obtained when the barrage works would have been completed"—*i.e.*, in 1952. In the Corpach scheme, the promoters of the Bill, the British Oxygen Company, estimate that the cost of water power would be no more than 0·112d. Power generation at the Severn would be varying and intermittent depending on the tide, unless a secondary storage scheme were to be included, and even then the current available would vary according to the season from 1,300,000 kWh per tide at neap tides to 4,680,000 kWh per tide at spring tides. Possibly the amount of current generated by the Corpach scheme would depend upon the rainfall, but at least there is a chain of lakes which were to be used as storage, so that the scheme would not be anything like so costly as the Severn Barrage, and the current would be reasonably continuous; if there were a shortage of current in the summer, the works could then undertake the necessary repairs and renovations.

Behind the promotion of the Caledonian Power Bill lies an attempt to establish electro-chemical industries in this country. The annual value of the products of electro-chemical industries that we import from abroad is some £2,000,000. The cost of water power depends largely on the capital cost of the plant. Before the War, when plant was cheaper than it is to-day, some Norwegian stations produced at a cost of 0·035d. per unit at the switchboard, with a load factor of 90%, and most pre-war water-power factories produced at 0·04d. to 0·09d. per unit. Large post-war stations have produced power—always with a load factor approaching 100%—of 0·065d. to 0·09d., and 0·145d. has been given as the outside post-war limit for water power cost. The Severn Barrage scheme was evidently well outside these limits, and the Corpach scheme is just within them. The inception of British electro-chemical industries is in every way a proper application of electricity, and there can be only one valid reason for rejecting a scheme such as the Caledonian Power Bill—namely, that a cheaper source of power could be found. It was claimed in the Parliamentary debate that it was possible to produce power in a coal-fired power station, from Welsh anthracite duff at 5s. a ton, cheaper than from water power at Corpach, and that, in addition, the cost of conveying anthracite and lime for the process would be much less if the factory were situated in South Wales. It seems that the arguments pro and con turn wholly upon this factor.

Forthcoming Engagements

April.

1.—MIDLAND JUNIORS.—Meeting at Birmingham. Paper on Gas Water Heaters.
3.—MANCHESTER AND DISTRICT JUNIORS.—Annual Dinner.
3.—SCOTTISH EASTERN JUNIORS.—Visit to Bruce, Peebles, & Co., Ltd., Edinburgh.
8.—S.B.G.I.—Council Meeting, 2.30 p.m.
9.—NORTH BRITISH ASSOCIATION.—Spring Meeting at Edinburgh.
9.—B.G.F.—Exhibitions Committee, 3.30 p.m.
13.—N.G.C.—Central Executive Board, 2.30 p.m.
14.—GAS COMPANIES' PROTECTION ASSOCIATION.—General Meeting at Caxton Hall, 2.30 p.m.
17.—LONDON AND SOUTHERN JUNIORS.—Visit to Watford and St. Albans Gas-Works.
17.—MIDLAND JUNIORS.—Visit to Leamington Spa.
17.—YORKSHIRE JUNIORS.—Meeting at Bradford. Paper by H. Johnston, "Materials and their application to Gas-Works Constructions."
21.—B.C.G.A.—Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m.
21.—I.G.E.—Pipes Committee, 3 p.m.
22.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
23.—I.G.E.—Gasholder Committee, 2.30 p.m.
24.—WALES AND MONMOUTHSHIRE JUNIORS.—Annual General Meeting at Porthcawl.
24.—WESTERN JUNIORS.—Annual General Meeting at Clevedon. Presidential Address by S. B. Jones.
30.—NORTH OF ENGLAND ASSOCIATION.—Annual Meeting at Newcastle.

May.

1.—SCOTTISH JUNIORS.—Joint Visit to Parkinson & Cowan, Ltd.
5.—S.B.G.I.—Annual General Meeting and Dinner, May Fair Hotel. Council Meeting in the morning at 56, Victoria Street, S.W. 1.
5.—MANCHESTER AND DISTRICT JUNIORS.—Visit to R. & J. Dempster, Ltd., Manchester. Paper by A. E. Hardman (Widnes), "Atmospheric Pollution."
6.—MIDLAND JUNIORS.—Annual General Meeting.
7.—LONDON AND SOUTHERN JUNIORS.—Annual Business Meeting.
15.—SCOTTISH EASTERN JUNIORS.—Annual General Meeting at Dunfermline.
22.—YORKSHIRE JUNIORS.—Short Paper Meeting at Halifax. Papers by C. Daughtery (Leeds) and J. Castle (Brighouse).

PERSONAL

Presentation to Mr. H. James Yates

At the Annual Meeting of Radiation Limited, a report of which appears on later pages, Mr. C. Herbert Smith presented, on behalf of the Board, an oil painting of Mr. H. James Yates, to be placed in the Board Room, as a mark of appreciation from the Directors of Mr. Yates' valuable services to the Company as Chairman and Managing Director. The Board presented to Mr. Yates a replica of this painting.

Mr. H. James Yates was the Founder of Radiation Limited in June, 1919. He was the first Chairman of the Company, and is still the Chairman. Previously, for many years, he was Chairman and Managing Director of John Wright & Eagle Range, Ltd., and their Subsidiary Companies.

The great success of Radiation is due to the fact that Mr. Yates has devoted the whole of his time to the Company, and under his control and guidance the business continued to grow year by year, and there are now upwards of 100 acres of works, and 10,000 workpeople. Mr. Yates as a very young man was always keenly interested in research work, and he had a laboratory at his own home. Forty years ago he installed a research laboratory in his works, and it is due to Mr. Yates' personal early research work that we have the modern Radiation gas cooker, gas fire, and other domestic gas appliances.

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Councillor JOHN BENTLEY, of Great Harwood, one of the oldest members, is retiring from the Accrington District Gas and Water Board, on which he has served over 20 years.

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At the Annual Meeting of the Institution of Heating and Ventilating Engineers on Feb. 10, Dr. F. M. H. TAYLOR, of the Gas Light and Coke Company, was elected a Member of the Council.

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Mr. ANDREW WALKER, Engineer and Manager of the Kilbarchan Gas Company for the last 17 years, was presented on March 24 by colleagues and friends with a writing bureau to mark his departure for Irvine, where he has been appointed Engineer and Manager.

New Appointments for Mr. J. R. W. Alexander

The Council of The Institution of Gas Engineers has regretfully accepted the resignation as Secretary of the Institution of Mr. J. R. W. ALEXANDER, M.A., LL.B. (Hons. Cantab), F.C.I.S., Barrister-at-Law of the Inner Temple. The Council unanimously resolved to record in its Minutes its high appreciation of the valuable services of Mr. Alexander since 1929 and its sincere good wishes for success in his new Appointments as General Manager of Associated Gas and Water Undertakings, Ltd., and General Manager of the East Surrey Gas Company. The changes become effective on June 21, 1937.

J. R. W. ALEXANDER.

Resignation of Mr. W. H. Bennett.

Owing to pressure of work involved by his connection with Associated Gas and Water Undertakings, Ltd., and his other interests, Mr. W. H. BENNETT is resigning as Managing Director of the East Surrey Gas Company. He will continue, however, to be Deputy-Chairman and will act in a consultative capacity. Mr. W. H. Bennett and his brother, Mr. C. Valon Bennett, are members of the Council of the Institution, of which Mr. C. Valon Bennett is a Past-President. Their grandfather, Mr. William H. Bennett, was Hon. Secretary and then Secretary of the Institution during the nineteen years 1869 to 1888.

Associated Gas and Water Undertakings, Ltd.

Associated Gas and Water Undertakings, Ltd., was incorporated in 1933. It has an authorized share capital of £3,500,000 and loan capital of £500,000. Its Ordinary and its 4½% Cumulative Preference Shares of £1, fully paid, are at present quoted at about 21s. each and its 3½% Redeemable Debentures at 95-100.

The Directors are Mr. W. Lees Stenning, M.B.E., J.P. (Chairman), Mr. W. H. Bennett (Deputy-Chairman), Mr. J. H. Donaldson, Mr. John Urquhart, and Mr. Alexander E. Whitcher.

The 14 Public Utility Undertakings already associated in the Company make a total of 2,200 million cu.ft. of gas per annum and supply 75,000 consumers through 875 miles of main. Three of these undertakings also supply electricity, generating and/or purchasing a total of 7½ million units per annum and having 6,500 consumers.

The Associated Undertakings at present are the East Surrey Gas Company (Redhill-Reigate-Dorking-Godstone and District), the Yorktown (Camberley) District Gas and Electricity Company, the Farnham Gas and Electricity Company, the Guildford Gas Light and Coke Company (which also supplies electricity in Cranleigh), and the Haslemere and District Gas Company, all in Surrey; the Haywards Heath, Horsham, Steyning, and Midhurst Gas Companies, all in Sussex; the Edenbridge and Westerham Gas Companies, both in Kent; the Chesham Gas Company in Buckinghamshire; and the Alresford Gas Company in Hampshire.

East Surrey Gas Company.

The East Surrey Gas Company was established in 1860 in Redhill and acquired the Reigate, Godstone, and Dorking Gas Companies in 1921, 1924, and 1928 respectively. The Chairman is Mr. W. Lees Stenning and the Deputy-Chairman is Mr. W. H. Bennett. The Company makes 610 million cu.ft. of gas per annum and supplies 20,000 consumers through 212 miles of main in an area of 120 square miles.

Mr. J. R. W. Alexander.

Mr. Alexander was appointed, from 650 candidates, Secretary to The Institution of Gas Engineers in 1929, in which year the Institution, founded in 1863, was granted a Royal Charter by H.M. King George V. Mr. Alexander was especially charged with the re-organization and extension of the work of the Institution and has taken a prominent part in the increasing activities of the British Gas Industry. He initiated and organized the Reparations Dinner to His Excellency the American Ambassador (General C. Gates Dawes) in London in 1929, the First International Gas Conference in London in 1931 (which was attended by 1,500 delegates from 25 Nations), and the visit of the Institution to Canada and the United States of America in 1933. He was a Founder and is a Member of the Council of The International Gas Union and has represented the Institution at, and taken part in the organization of, numerous International and National Conferences at Home and Overseas. As organizer, he raised over £10,500 for the Sir Arthur Duckham Memorial Fund, of which he is Hon. Secretary and Treasurer. He is a member of the small Public Relations Executive Committee recently jointly set up by the principal Engineering Institutions.

He was appointed to the honorary office of Joint Secretary of the British Gas Federation, which was founded in 1934 to further the interests of the Gas Industry.

Born in 1897, Mr. Alexander is a Citizen and Freeman of the City of London and was educated at Ardingly College and Cambridge University, where he took Honours

in the Historical and Law Triposes and was elected a Governor-Trustee of Fitzwilliam Hall. He is a Governor of Ardingly College, a Trustee of the Ardingly College Mission at St. Gabriel's, Poplar, a Past Master of the Ardingly College Lodge, No. 4410, Treasurer of the Woodard Chapter, No. 4410, and the Founder and a Past-President of the Fitzwilliam Society.

A Member of the Ardingly College Officers' Training Corps, Mr. Alexander received his Commission soon after the outbreak of war and at the age of 17 years, in the Royal Sussex Regiment. He was wounded during the Battle of the Somme, Mentioned in Despatches, and awarded the Italian Silver Medal for Military Valour. More recently he qualified as an Air Pilot and became a Flying Officer in the Royal Air Force Reserve.

A pupil of the late Hon. Mr. Justice Fraser, the great authority on Parliamentary Law and the Law of Defamation, Torts, and Industrial Disputes, Mr. Alexander was Called to the Bar, on the proposition of the late Hon. Mr. Justice Bateson, by the Honourable Society of the Inner Temple. He is a Fellow of the Chartered Institute of Secretaries and one of the limited number of members of the Scientific Secretaries' Society. A Fellow, Member of Council, and Chairman of the Finance and General Purposes Committee of the Institute of Arbitrators, he served on the small Committee which, under the Chairmanship of Lord Askwith, drafted the Arbitration Act, 1934.

Formerly Parliamentary Secretary and then Standing Counsel to the Society of Incorporated Accountants and Auditors, Mr. Alexander was entrusted with its Parliamentary, Governmental, Legal, and Public Relations work. The extent of his activities, however, prevented his accepting the invitation of the Newcastle-under-Lyme Conservative Association to oppose at the General Election in 1935 the Labour Member, Colonel the Right Hon. Josiah C. Wedgwood. A writer in professional and technical publications, he was the Author of "Incorporated Accountants' Hall—Its History and Architecture." He was responsible for the acquisition, restoration, and adaptation of this magnificent building, which cost the Society over £110,000 and was ceremoniously opened by Their Majesties the King and Queen, then T.R.H. the Duke and Duchess of York.

Appointment of Successor.

Elsewhere in this issue appears a Notice inviting Applications for the Secretaryship of the Institution at a salary of £1,250 per annum, the Conditions of Appointment being obtainable from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

Obituary

The death occurred at Kirkcaldy on March 21 of Mrs. IDA BROWN KINCAID, wife of Mr. James Kincaid, formerly Engineer and Manager at Kirkcaldy.

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We learn that Mr. ROBERT DEXTER LITTLEFIELD died on March 18, in his sixty-fifth year. He was born at Ventnor, Isle of Wight, and educated at Cranleigh and University College, London. For a time he was assistant to Sir William Ramsay, later being engaged in research work for the Royal Commission on Sewage Disposal with particular reference to river pollution. In this connection he carried out much work in Scotland. In 1909, he was appointed to an Inspectorship under the Alkali Act and was thus brought into intimate contact with chemical industries in many parts of the country. From 1920 until his retirement in 1931 he was in charge of the South-Western District.

He became an Associate of the Institute of Chemistry in 1898 and a Fellow in 1911, serving on the Council from 1922 to 1925. He alo took a great interest in the Society of Chemical Industry and was Chairman of the Bristol Section from 1931 to 1934.

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A well-known figure in the Industry, Mr. JOSEPH SHARPE NAYLOR, of Hall Drive, Morecambe, died suddenly on March 20. Only the previous day he had been to the Grand National.

Born in Cleckheaton, Mr. Naylor started his career there as a weigh boy and worked his way up to the position of Assistant. He left Cleckheaton in 1891 to become Engineer and Manager at Selby, Yorkshire. His next move was to take a similar post at Droylsden under the Manchester Corporation. He later moved to the Rochdale Road Gas-Works, Manchester, and in 1905 became Engineer and Manager of the Rotherham Corporation Gas Department, retiring in 1927.

Among those who attended the funeral at Morecambe on March 23 were Mr. H. Barton (representing the Manchester District Association), Mr. A. L. Holton (Chief Engineer, Manchester), Mr. T. W. Barratt (Morecambe), Mr. T. R. Cook (Blackpool), and Mr. W. A. Dearden (Lancaster).

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

The Calorific Value of the gas supplied by the Darlington Corporation after July 1 next will be 500 B.Th.U. per cu.ft.

The Strike which occurred at some of the factories of Parkinson & Cowan (Gas Meters), Ltd., has now been settled to the mutual satisfaction of all parties.

Second Prize in the shop window display competition in connection with the first St. Blazey and Par Shopping Week was won by the St. Blazey Gas Company in the "What We Use" class.

Free Gas for Floodlighting will be supplied by the Oldham Gas Department to public bodies and private people for illuminations during Coronation week, the apparatus for the lighting being supplied by the people concerned.

More than Usual Interest was evinced in the gas cookery demonstrations held last week in the showrooms of the Wolverhampton Gas Company. Excellent service to gas propaganda was rendered by Miss E. Eccles, of the Cannon Research Kitchen, whose able demonstrations were greatly appreciated.

There Were Large Attendances each day at a four-days' exhibition at Kendal Town Hall, which was arranged by the Parkinson Stove Company in conjunction with the Kendal Gas Department. The exhibition incorporated entertainment by the Parkinson Players and cookery demonstrations. The Mayor of Kendal (Mr. B. Alexander) performed the opening ceremony, being welcomed by Miss Gwen L. Hughes, the author and producer of the plays presented by the Parkinson Players.

An Increase in the price of gas from 4s. 3d. to 4s. 6d. per 1,000 cu.ft. and coke from 21s. 8d. to 23s. 4d. per ton has been decided by the Fraserburgh Town Council owing to the increased price of coal and freight charges.

We Regret that in a news item in last week's "JOURNAL" dealing with the heating of Morecambe's new Swimming Stadium we referred to Mr. T. W. Barratt, who, of course, is the present holder of the position, as the "former" Engineer and Manager to the Morecambe and Heysham Gas Department.

Application is Intended to be made to the Board of Trade by the Haslingden Union Gas Company under the Gas Undertakings Act, 1929, for an Order authorizing the applicants on such conditions as may be specified in the Order to borrow for the purposes of their Undertaking on mortgage an amount equal to 75% of the paid-up share capital.

An Exhibition arranged by the Lockerbie Gas Commissioners was held during the week commencing March 22 in Lockerbie Town Hall. The exhibition comprised a wide range of gas cookers, washing machines, and fires, and cookery demonstrations were given daily by a representative of Messrs. R. & A. Main, Ltd., Falkirk. The exhibition was formally opened on March 22 by Mrs. Sinclair. Provost Jardine referred to the progress the undertaking in Lockerbie had made since it was taken over by the Town Council some 40 years ago. At that time the make of gas was in the region of 4 million cu.ft. per year, but to-day something like 19 million cu.ft. of gas was manufactured annually.

The Institution of Gas Engineers

Annual General Meeting—Provisional Programme

TUESDAY, JUNE 1.

Morning: Opening of 74th Annual General Meeting in the Hall of the Royal Geographical Society, Exhibition Road, Kensington, S.W. 7.
74th Annual Report and Accounts; 1936-37.
Presentation of Medals.
Presidential Address by Mr. Stephen Lacey.
Submission to Corporate Members of Resolutions for the Amendment of the By-Laws Governing Admittance to the Institution and of other By-Laws.
Paper on "The Consolidation of Gas," by C. F. Broadhead (Melbourne, Australia).
Photograph.
President's Luncheon (Savoy Hotel).

Afternoon: Paper on "New Horizons in Gas Manufacture," by E. G. Stewart.

Evening: Reception and Dance (Grosvenor House).

WEDNESDAY, JUNE 2.

Morning: Paper on "Distribution in Suburban and Rural Areas," by H. J. Escreet
General Meeting of The Benevolent Fund of The Institution of Gas Engineers.
Paper on "Technical Aspects of the Holding Company Movement," by Geoffrey M. Gill.

Afternoon: (*a*) Visits to Gas Light and Coke Company at Fulham:—
(1) Gas Works.
(2) Gas Manufacture Research Laboratories.
(3) Gas Distribution and Utilization Research Laboratories (the new Watson House).
(4) Stove and Meter Works.
(*b*) Visit to Science Museum (South Kensington).
(*c*) Ladies' Visit to and Tea at National Maritime Museum (Greenwich). The Museum is to be opened by His Majesty the King on April 27.

THURSDAY, JUNE 3.

Morning: Paper on "The Future of Gas Appliance Design," by C. A. Masterman.
Paper on "Consumer Service," by R. N. Le Fevre.
Termination of 74th Annual General Meeting.
Council Luncheon to the President (1, Grosvenor Place).

Afternoon: (*a*) and (*b*) Visits as for Wednesday afternoon.
(*c*) Ladies' Visit to and Tea at the Gardens of the Royal Zoological Society (Regents Park).

FRIDAY, JUNE 4.

VISIT TO FOLKESTONE.

Morning: Special Train from Charing Cross to Shorncliffe—Drive—Visit to Gas Showrooms.
Luncheon at Hotel Metropole, Folkestone, by invitation of the Folkestone Gas and Coke Company.

Afternoon: Visits by Motor Coach to (i.) Lympne Aerodrome (Special Display by Royal Air Force and Inspection of Aerodrome), (ii) Gardens of Port Lympne (Residence of Sir Philip Sassoon), and (iii.) Lympne Castle (Tea).

Evening: Special Train from Sandling Junction to Charing Cross: Supper on Train.

3rd International Gas Conference.

We are informed by the Secretary of The Institution of Gas Engineers that considerable interest is being shown in the Third International Gas Conference of The International Gas Union, to be held in Paris from June 12 to 16. Over fifty members of the Institution and others have already intimated their provisional intention of joining the British Delegation, the hotel, travel, and other arrangements for which are being made by Mr. J. R. W. Alexander, who will accompany the party.

Fuel Research Station Visitors' Day, 1937

Members of The Institution of Gas Engineers are invited to participate in Visitors' Day at the Fuel Research Station of the Department of Scientific and Industrial Research, Blackwall Lane, East Greenwich, London, S.E. 10, on Tuesday, June 1, 1937, from 2 to 6 p.m.

Opportunity will be afforded of inspecting the laboratories and large scale experimental plants and of obtaining a general insight into the whole range of the fuel research work of the Department of Scientific and Industrial Research.

A free service of motor coaches will operate between Maze Hill Station and the Fuel Research Station for visitors travelling by train.

Invitation Cards, which are necessarily limited in number, will be required, and requests for them should be sent before April 23 to the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1, for transmission to the Director of Fuel Research, Dr. F. S. Sinnatt, C.B., M.B.E.

Amalgamation and Grouping

Loughborough and Quorndon.

This amalgamation was referred to in our issues of Jan. 6 and 20; in the latter issue it was intimated that the offer of the Loughborough Corporation had been accepted by the Directors of the Quorndon and Mountsorrel Gas Company. Application is now intended to be made to the Board of Trade by the Loughborough Corporation for a Special Order under the Gas Undertakings Acts, 1920 to 1934, with the object *inter alia* of vesting in the Corporation the Quorndon Undertaking.

Severn Valley and Nantwich.

We understand that at the last meeting of the Nantwich Urban Council it was decided to negotiate with the Severn Valley Gas Corporation for the sale of the Gas Undertaking, which was acquired by the town forty years ago at a cost of £68,000.

Explosion at Dundee Showrooms

Premises Damaged by Fire

As the result of an explosion at the showrooms of the Dundee Gas Department on March 17 five men were injured and the premises were extensively damaged by fire. The Engineer and Manager, Mr. John Wilson, has been kind enough to forward us the following particulars of the circumstances attending the explosion:

The main low-pressure supply pipe at Broughty Ferry Works passes through the office and showroom buildings of which building the governor house is an integral part. Repairs were being carried out on one of the diaphragm governors in connection with the auxiliary boosting plant for operating the wave system for public lighting. As is the practice in Dundee, in opening such gas apparatus for repair, the men were wearing gas masks with a connected tube through which fresh air is drawn from the outside air. The cover had been loosened when it was noticed that there was a fair quantity of gas present. The men immediately replaced the cover and were preparing to bolt it on again when the explosion occurred. This explosion was followed by fire and, as there was a good deal of wood lining about, the office and showroom building was practically gutted. Owing to the explosion the ceiling fell on top of the men and the air tubes. It was therefore necessary to cut these tubes in order to get the men out. This was fortunately achieved before the fire had got a complete hold. Two of the men were burned about the hands and the head, the third about the head. The fire brigade were soon on the scene and successfully saved adjacent buildings.

The usual precautions had been taken to see that the gas in the building itself had been turned off. Owing to the fact that the men concerned are still off duty it has been impossible to complete enquiries into the actual cause of the explosion. Gas was supplied to the Broughty Ferry area through a different source until such time as the low-pressure feed from the Broughty Ferry Works was made safe, but full pressure was restored through the high-pressure system at about 6 o'clock in the evening so that there was no great inconvenience caused to consumers in that area.

The Coke Oven Managers' Year Book

1937 Edition

Special interest attaches to the 1937 Edition of the Coke Oven Managers' Year Book as it marks the coming-of-age of the Association. The Editorial Committee have certainly succeeded in their endeavour to maintain the standard of utility of the Year Book as a record of the progress made by the British Coking Industry.

The Year Book, published by Benn Bros., Ltd., for private circulation only, is now firmly established as a record of practical work and information, valuable to all who are in any way interested in coking practice. In this, as in previous issues, the usefulness of the book is preserved by the inclusion of only such matter as is considered likely to be of service. Included in the contents is useful information on the revised rules and membership of the Coke Oven Managers' Association, with lists of officials, Past-Presidents, and Members.

The remainder of the volume is devoted to the transactions of various sections of the Association, full reports, with photographs and diagrams, being given of the various Papers read. Altogether this is a very useful book, summarizing in a comprehensive manner another year's activities of our sister industry. Users of the book should find it not one whit less valuable than its predecessors.

Fancy and Practical Gas Cookery

Demonstrations at Spalding

Fancy and Practical Cookery within the scope of the ordinary gas user was the main object of the demonstrations held last week at Spalding. Large numbers of people availed themselves of the guidance given by Miss Eccles, of Cannon Iron Foundries, Ltd.

Greatly appreciated were the efforts of Mr. J. Demain in making the new showroom of practical assistance to gas users by demonstrating the latest labour-saving appliances.

Centenary Celebrations at Annan

Exhibition and Demonstrations

The Centenary Exhibition to celebrate this important landmark in the history of the Annan Gas Company has been successfully held in the Victoria Hall, Annan. The exhibition and cooking and washing demonstrations attracted large crowds who showed considerable interest in the modern gas equipment exhibited, which was of a very comprehensive nature.

Gas Water Heating Display.

Cookery demonstrations were given by Miss Barbara Cobb, of the Parkinson Stove Company, Ltd., which were attended by crowded audiences. One of the leading features was a Cake-Baking Competition which attracted many entries, and the judging was carried out by Miss Cobb. The difficulty of deciding the winners was greatly added to by the uniform good quality of the entries. The successful competitors were announced in the presence of a large gathering. In the absence of Capt. W. Cuthbertson, Chairman of the Company, who sent a message of regret on his being prevented from attending, the chair was taken by Mr. A. F. Nish, Secretary and Treasurer. The prizes were presented by Mrs. H. Robinson, wife of Mr. Harold Robinson, Manager of the Company.

The staging of the Exhibition and its outstanding success was due to the thorough and enthusiastic efforts of Mr. Robinson, and he and his staff are to be complimented on the results achieved.

Glasgow Corporation Severely Criticized

Coke Oven Gas Decision

The decision of the Glasgow Corporation with regard to taking coke oven gas supplies (reported in last week's "JOURNAL") was severely criticized by Mr. J. H. Maurice Clark, President of the Glasgow Chamber of Commerce, when he spoke on March 22 at a meeting of the Directors of the Chamber.

The attitude of the Corporation, said Mr. Clark, was driving orders from the West of Scotland to Germany and England. Glasgow had given a raw deal to the workers of the West of Scotland. Work on the proposed plant at Gartsherrie had been held up for three years. Mr. Clark quoted the report of the Walker Committee, which stated that unless a market was found for coke oven gas, the pig-iron industry in Scotland would not survive.

Britain would soon be in such need of pig iron, Mr. Clark continued, that the import duty would be removed. Germany would then enter the field and would be in a position to hold their customers. If Glasgow took this coke oven gas the consumption in the City would increase because of its cheapness. Even if some men were displaced, they would be absorbed in the new industries created.

Treasurer P. J. Dollan, said Mr. Clark, desired a gas grid. If that came, Gas Commissioners, as in the case of the Electricity Grid, would dictate what works were to be kept open or closed. Certain members of Glasgow Town Council did not desire to help private enterprise, but their action was helping it elsewhere!

Scottish Western Juniors

Visit to Glenboig Union Fireclay Company

On March 20 members of the Scottish Junior Gas Association (Western District) availed themselves of the opportunity of seeing the works of the Glenboig Union Fireclay Company.

The party was welcomed by Mr. Bennie and was then conducted round the works. The Glenboig Works has been producing high-grade firebricks for all types of industrial furnaces since 1836. The reserves of Glenboig clay are enormous. What has so far been mined and used is only a mere fraction of the quantity still available so that the Glenboig Company's future is likely to be even more impressive than its past.

In addition to plant extensions the Company are also building a complete new laboratory as they find that the existing accommodation is inadequate for present-day requirements. When their new laboratory is completed, facilities for investigation and research will be second to none.

At the conclusion of the visit the visitors were entertained at tea, over which Mr. Knox, the Managing Director, presided. In a few well-chosen words, Mr. Knox expressed the pleasure that it had given his Company to entertain the Juniors that afternoon and he hoped that their visit had not been unprofitable. He also outlined some of the Company's activities and what they were trying to achieve and the difficulties which had to be overcome.

Mr. John Webster, President of the Western District, suitably replied, asking Mr. Knox to convey to his Board the thanks of the Association for the facilities and hospitality which had been extended to them that afternoon.

A Hundred Years of Gas at Runcorn

Growth of the Undertaking

The Runcorn Gas Company celebrated its centenary on March 24 when a luncheon was held at the Masonic Hall, Runcorn. Colonel W. M. Carr, Chairman of the Directors, presided.

The Company's first works were erected in Gas Street, and in the first year the Company had ninety-five customers. Last year the number of consumers was 6,138 and the output was 122,803,000 cu.ft. The present Works in Halton Road, Runcorn, were opened in 1894. The managerial reins were in the hands of Mr. J. R. Frith for forty-nine years, and he was followed by his son, Mr. G. S. Frith, who has just completed twenty-five years' service as Engineer, Manager, and Secretary.

Mr. R. E. Gibson, Chief Engineer of the Liverpool Gas Company, proposing "The Runcorn Gas Company," said the name of Frith was synonymous with the Runcorn Gas Undertaking. Mr. J. M. Frith, a past Chairman of the Company, responding, said the future of the Industry was more promising than it had been at any time since the war. They knew in official circles how much the Government depended upon the Industry during the war, both for the supply of raw materials and the production of high explosives.

Sir Frederick West, proposing "The Town and Trade of Runcorn," said the progress of the Runcorn undertaking was synonymous with the progress of the town. He thought that in all towns people should be reminded from time to time of the public utility service which contributed to their progress and their domestic comforts. Mr. Peter Smith, Chairman of the Runcorn Urban Council, responded.

Colonel W. M. Carr proposed the toast of "Our Guests," which was responded to by Councillor W. P. Jackson, President of the B.C.G.A. and Chairman of the Manchester Gas Committee.

International Association for Testing Materials

International Congress

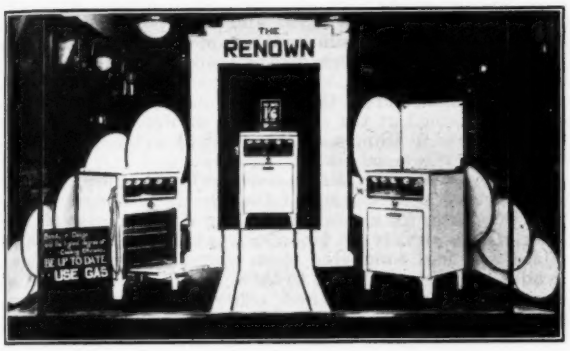
The International Congress of the International Association for Testing Materials will be held in London on April 19-24.

The Congress is likely to be of great practical importance to all in this country who are makers or users of the materials concerned (and these include most of our important industries) in addition to being of interest to those engaged in their scientific study.

This is the first occasion on which a Congress of this Association has been held in London, and it is unlikely that another will be held here for many years—the Congresses being organized only at intervals of 3-5 years and usually in different countries.

Particulars of the Congress may be had from the Hon. Secretary, Mr. K. Headlam-Morley, 28, Victoria Street, London, S.W. 1.

Striking Cooker Display at Rugby



This striking display was arranged recently in the showroom window of the Rugby Gas Company, and features, as can be seen, Parkinson's "Renown" gas cooker.

Illuminating Engineering Society

Annual Dinner and Dance

The annual dinner and dance of the Illuminating Engineering Society was held at the Trocadero Restaurant, Piccadilly Circus, W. 1, on Tuesday, March 16. The chair was taken by the President of the Society, Mr. Arthur Cunnington, B.Sc., M.I.E.E., and there was a very gratifying attendance of members and their friends.

Proposing the Toast of "The Illuminating Engineering Society," Mr. G. Grey Wornum, F.R.I.B.A., stressed the fact that lighting was one of the most important subjects in our lives to-day. The Society was, therefore, fulfilling a function which was deserving of the highest praise, and he had recently read with great pleasure that support of the Society was becoming quite encouraging. What he did appreciate about the Society was the fair balance it maintained between the gas and electrical interests of its membership; there was absolutely no distinction between the two. The Society also granted generous facilities to students and even opened their ranks to the architect! As a subject for future investigation by the Society, Mr. Wornum suggested that it might well consider the study of colour in relation to its effect on the individual.

Responding, the President observed that Mr. Grey Wornum's suggestion had certainly given them some new line of thought. The Society was indeed grateful to him for his useful suggestions. He would like to refer to the expansion which the Society had made in recent years, and he thought the efforts which had been made in that direction had been to rope in, and get the best out of, the various interests in lighting. He had no fear the new specialized sections would get them out of touch with fundamentals so long as they did not lose sight of their true aspect. As regards the future, he earnestly looked forward to the time when illuminating engineering would be regarded as a more exact science than it was at the present time. They all acknowledged that Mr. J. S. Dow, their Secretary, and his staff were the very heart of the Society and they had risen very well indeed to the extra work involved during the expansion of the Society. That expansion was particularly due to the efforts of Mr. Hepworth Thompson, and the President added it must be a great source of pleasure to him to see those efforts come to fruition.

"The Guests" was in the hands of the Vice-President, Dr. S. English, F.I.C., F.Inst.P., who said he was somewhat surprised by the wide range which the guests covered. The first group included the Institutions of Electrical and Gas Engineers, and it was interesting to note that the Presidents of both those Institutions were members of their Society and had served on the Council. The Association of Public Lighting Engineers was represented by their President, Mr. E. C. Lennox, and Dr. English expressed the hope that with the formation of the Public Lighting Section of the Society there would result a greater measure of co-operation between the two bodies. They were also happy in having with them Mr. Asa Binns, President of the Institution of Engineers-in-Charge.

The response was by The Dowager Lady Swaythling, Vice-President of the Electrical Association for Women.

Wales and Monmouthshire Association

Forthcoming Annual Meeting

The Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers will be held at Cardiff on Thursday, May 27 next, under the Presidency of Mr. H. D. Madden, Engineer and Manager of the Cardiff Gas Light and Coke Company.

Hotel, Restaurant, and Catering Exhibition, 1937

Preliminary Arrangements

The Hotel, Restaurant, and Catering Exhibition is announced to take place at Olympia, London, from Nov. 30 to Dec. 8.

Organized by the hotel trade journals, the *Caterer and Hotelkeeper* and the *Hotel Review*, in association with Trade and Technical Exhibitions, Ltd., this big trade show has the official support of the organized hotel and catering industry through its national and provincial trade associations. The many trading interests associated as suppliers with the hotel and restaurant industry, which will be represented by exhibits, embrace kitchen engineering, gas equipment, refrigeration, sanitary engineering, heating, air-conditioning, and lighting, besides, of course, food, drink, &c. So successful was the last Catering Exhibition, when 31,000 trade visitors attended from all over the United Kingdom, that the demand for stands for this year's show has been immediate and heavy. We are informed by the Exhibition organizers that already, with eight months to go, nearly 80% of the available space has been let. Lettings of the remaining stand space are being carefully controlled to ensure that the exhibition shall be both comprehensive and well balanced, and shall completely reflect the great diversity of the hotel and catering trade's requirements.

Church Floodlighting at South Normanton

Our photograph shows the excellent results obtained by the South Normanton and Blackwell Gas Company in floodlighting South Normanton Church. The units employed comprised seven "Avil" strip lanterns by Foster & Pullen, Ltd.

London Juniors Visit Paper Mills

Interesting Afternoon at Dartford

Members of the London and Southern District Junior Gas Association spent a most interesting afternoon on March 10 learning how paper is made, and we are sure they left the mills at Dartford with a feeling of far greater respect than they had hitherto entertained for the unromantic substance on which these words are printed.

The visit took place at the kind invitation of Messrs. Wiggins, Teape, & Co. (1919), Ltd., and after an inspection of what used to be known as the Daily Telegraph Mills the members went on to the adjoining Greaseproof Paper Mills, Ltd. (a subsidiary of the former Company). As the processes witnessed in each of the two mills are mainly similar, it is only necessary to describe them here in principle, though it should be mentioned that all the plant at the Greaseproof mills is, of course, of a more modern design, while the whole layout has been planned with much care and forethought with a view to attaining a smooth sequence of manufacture from start to finish.

The opening of the Greaseproof Paper Mills in 1933 constituted a spirited attempt to capture for this country a section of trade which had up to then been practically a monopoly of the foreigner—*i.e.*, the production of bleached and unbleached greaseproof, transparent and glassine. Greaseproof paper is one of those commodities which is in great and growing demand in all parts of the world and for which new uses are constantly being found. The Dartford mill is capable of a yearly output of 12,500 to 15,000 tons, and it is a mill as perfect as knowledge and experience could devise, planned to give abundant light and air, and large enough to meet increasing demands, with useful access to water transport for raw materials and a plentiful supply of clean water from deep artesian wells—and paper making demands an almost fantastic amount of water every day, running into millions of gallons.

Dealing first with the power house—provider of the " life-blood " of the whole mill—this immense plant is probably one of the finest of its kind in the country. It supplies electrical power for the machines, together with large quantities of steam for drying the paper as it passes over the rollers. The power plant consists of three enormous tridrum water-tube boilers by International Combustion, Ltd., automatically fed by an Underfeed stoker using coal slacks which are elevated into steel storage bunkers in the roof of the building. Each boiler is capable of producing 60,000 lb. of steam per hour at a pressure of 500 lb. per sq.in. and 750° superheat. These boilers supply the steam for three turbo alternators of 3,750 kW capacity. The whole of the machinery in the mill is motor driven, the larger of the motors being operated at the full available voltage of 3,300, this voltage being reduced to 400 for the smaller motors.

The Process of Paper Making.

Coming now to the process of paper making, we see the raw material arriving in the form of bundles of sheets of compressed wood fibre—vast stacks of this material are piled high in the yard awaiting use. These sheets are put into great iron vats where, liberally mixed with water, they are churned and kneaded into a pulpy mass. From the " beater " floor this pulp is pumped up to the refining stage, where it undergoes further treatment, including the addition of certain constituents such as blue, which, paradoxically, is introduced to produce whiteness, a process with which housewives are familiar on washing day, and also certain bleaching ingredients if bleached paper is being manufactured, or colouring matter if coloured paper is required. A very close check is kept at this stage upon the water content, the proportion being governed to extremely fine limits.

Finally the pulp drops down once more to the machine floor, where it passes through a grit arrester, which extracts any fine particles of solid matter which may still be present, and then through a rectifier which can, if necessary, correct the " mixture " in the event of the tester on the floor above having passed the pulp a point or two in error. By the time the pulp is ready to pass on to the machines it is in a smooth semi-liquid form, which flows out in a thin stream on to the 15 ft. wide " wire " to be carried swiftly towards the jaws of the giant rollers waiting to pick up the sheet of paper which is now taking shape. The last few feet of the " wire " pass over suction dryers, which have the effect of removing the first degrees of moisture from the strip. The sheet then plunges into the grip of the rollers, a score or more of which whirl the paper up and down along the whole length of the machine at a speed of 450 ft. per minute, finally ejecting it to be caught up on the collecting roller. All the rollers are subjected within to carefully controlled heat with a view to completing the drying process by the time the strip emerges.

It should not be imagined, however, that greaseproof paper is entirely bereft of all its moisture—it would not be greaseproof if it were. Actually the paper is impregnated with water in such a way that a sufficient proportion to maintain the greaseproof qualities is retained. That is all greaseproof paper really is—just ordinary paper with an insulation of moisture impregnated into it. And unless subjected to deliberate drying, the greaseproof qualities last indefinitely.

The collecting rolls when full are transported by overhead cranes to another part of the mill, where the paper is subjected to certain final processes to produce gloss or other finishes, after which it is seized by further machines which, in the twinkling of an eye, it seems, produce three narrow rolls from one wide one. Into the clutches of one more cutter goes the paper from these smaller rolls to emerge in separate sheets of good quality paper. So, strangely enough, the finished product comes out in general form and size not entirely dissimilar from the sheets of raw material which entered the beaters at the other end, though paper is, of course, despatched in rolls as well.

The batches of cut paper are carried to long benches, where the sheets are examined by a staff of girls who make them up into parcels of 480 sheets ready for packing and despatch. A guillotine is utilized for producing sheets of smaller size, this machine cutting through hundreds of sheets at one slice of its powerful knife. In conclusion, it may be mentioned that the mill itself was designed by Wallis, Gilbert, & Partners, and incorporates the most modern principles of industrial art, decorative design having been made to conform to the special needs of a special trade.

At the conclusion of the tour of inspection, the visitors were entertained at tea at the kind invitation of the firm, whose Despatch Manager (Mr. Knapp) extended a warm welcome to the members.

The President (Mr. R. Summerson) voiced the Association's sincere appreciation of their hosts' kindness in providing facilities for a most interesting visit and also of their generous hospitality. He also expressed thanks to the guides who had conducted them round the mills. It was, he added, of great interest to them to get outside their own jobs sometimes and see how other people were tackling theirs.

Exhibition and Demonstrations at Southport

Successful Programme

Considerable interest has been maintained in the gas cookery demonstrations and exhibition of appliances held under the auspices of the Southport Gas Department.

Miss E. Eccles, of the Cannon Research Kitchen, demonstrated the advantage of cooking by gas at well-attended sessions at Birkdale, Ainsdale, and Churchtown, and lectures at the gas showrooms by Mrs. Bentley concluded a month's programme which has been highly successful in every way.

To Mr. J. H. Clegg, Engineer and Manager to the Southport Gas Department, can be attributed the effective working of the scheme.

Combustion Appliance Makers' Association

Annual Luncheon

The fourth annual luncheon of the Combustion Appliance Makers' Association (Solid Fuel) was held at the Connaught Rooms, Great Queen Street, W.C. 2, on Tuesday, March 16. The Chair was taken by the President, Mr. J. Arthur Reavell, M.I.Mech.E., M.I.Chem.E., and among the guests were many distinguished by their work in the field of fuel research.

The Loyal Toast having been honoured on the call of the President, Captain H. F. C. Crookshank, M.A., M.P., Secretary for Mines, proposed " The Association," congratulating it upon the tremendous advances which had been made during a very short life. It was now fulfilling a very useful purpose, for coal could get itself a very bad name if burned in out-of-date appliances. In reply, the President referred to the fact that the basis of the Association was fundamentally technical; it was a meeting place for all who were interested in the utilization of solid fuel. It was not a trade association.

" The Guests " was proposed in light vein by Lieut.-Colonel J. H. M. Greenly, C.B.E., and responded to by Sir Harold Hartley, C.B.E., M.C., F.R.S., who observed that the work of the Association was concerned with giving to coal some of the qualities usually associated with its rivals. In this work, of course, a great deal depended on the size of the fuel, and here it was that the value of the nomenclature of the sizes of fuel was fully appreciated.

Nutrition Film Shown at Cambridge

Proceedings Opened by the Mayor

A large audience, including the Mayor and Mayoress, saw a showing of the Gas Light and Coke Company's Nutrition Film in the Dorothy Café on the evening of March 17 under the auspices of the Cambridge University and Town Gas Light Company. From all sides expressions of approval were heard, both of the matter contained in the film and of the entertaining way it is presented. Besides the main film, four other short films were shown.

Alderman H. T. Wing (a Director of the Company) presided at the opening ceremony, and was supported by the Mayor and Mayoress (Alderman and Mrs. W. L. Briggs), Mrs. Wing, Mr. F. J. Dykes, Major McCombie (Directors), Mr. J. Hunter Rioch (Engineer and Manager).

The Chairman read an apology from the Chairman of the Directors (Mr. J. F. Cameron, Master of Caius), who could not be present.

Mr. Wing went on to say that in arranging the showing of the Nutrition Film the Gas Company felt it was their duty and was in the interests of the inhabitants of Cambridge to see the first screen analysis of a great social problem with practical advice on the selection of a properly balanced diet.

The Nutrition Film set out the gravity and extent of the topical problem of nutrition. Sir Gowland Hopkins had carried through many important tests, and that should be of special interest to Cambridge. Welcoming the Mayor and Mayoress, the speaker said they were glad to have them at the showing of the film.

The Mayor said there was something they could all be thankful for, and that was that, in spite of all the troubles of the world to-day, interest was being taken in bodily health, both with regard to exercise and diet. That was a promising side of the rising generation, and even the older generation were finding some means of keeping in good physical state.

After the films, Mr. Hunter Rioch thanked the Mayor and Mayoress for coming to open the proceedings, and mentioned that in order that others could see the films six performances had been arranged in various parts of the town.

The Coal Position

Reports from Various Centres

A very serious state of affairs is indicated by reports received from various parts of the country regarding the coal shortage.

A correspondent at Glasgow states that at a meeting of Glasgow Corporation Gas Committee on March 22, Mr. J. McLusky, Engineer and Manager, reported that if the reduction in coal stocks continued, two of the Municipal Gas-Works would be entirely without supplies within a fortnight. In January, 74,200 tons were ordered and 47,957 delivered. Almost 65,000 tons were carbonized, 17,000 tons being taken from stock, reducing the reserve to 71,000 tons. In February, 72,750 tons were ordered and 47,259 delivered. The amount carbonized was 59,522 and reserves were further reduced to 58,856 tons. Then deliveries to March 20 were 17,500 tons short, the stock in hand being only 38,500 tons. If the rate of lifting from stock continued, two Works would be cleaned out in ten days.

The contractors explained that influenza in January and the snowstorms in February affected production.

Treasurer Dollan said it was anomalous that there should be shortage of coal in Lanarkshire when 17,000 miners in the county, equal to 15% of the total insured persons in the industry, were unemployed. Owners were making bigger profits than at any time since 1920. Further, Glasgow was paying £200,000 a year more for coal than it paid three years ago.

Last week, it will be recalled, we referred to the position in Edinburgh where the Corporation has protested to the Minister of Mines against the shortage of coal for public utilities. Here the shortage has forced the Gas Department to cease benzole production.

In the very heart of the South Wales coalfield serious repercussions on domestic supplies have followed the general shortage of coal in South Wales and Monmouthshire. Retailers are unable to get enough coal to satisfy the demands of their consumers. The manager of one of the larger South Wales gas undertakings points out that they are finding it very difficult to get coal, and they had to pay very high prices for any that was available. A large firm of coal factors in that district stated that it was all they could do to serve customers with hundredweights to keep them going instead of tons.

Review of "Specification," 1937

By Critic

In the preface to this year's edition of "Specification" (The Architectural Press, Ltd., 9, Queen Anne's Gate, Westminster, S.W. 1) the Editor, with justifiable pride, announces that the printing number of this invaluable publication has had to be increased by 50% in the last two years. It is evident that the policy of encouraging manufacturers to devote trade announcement pages to the presentation of information of practical utility to the architect has been highly successful.

Subjects receiving special attention this year are doors, windows, glass concrete construction, heating systems, radiators, boilers, loft ladders, bricks, asbestos cement, radio equipment, piling, partition blocks, and internal plumbing.

Gas engineers who are unfortunately concerned with protection measures against the possibility of aerial attack should find the "Air Raid Protection" section of Fire-Resisting Constructor especially useful; mention is made of all official publications dealing with this subject and certain Continental publications are referred to.

Concise notes concerning new materials have been added to the lists of proprietary products appearing in the various trade divisions, and in this connection three pages are devoted to the "Physical Properties of Insulating and Wall Boards;" as these materials find wider use in modern buildings this information should be of great assistance to the heating engineer, gasfitter, and plumber.

Among other sections the "Plumber and Sanitary Engineer" has been drastically revised, and is most instructive; the advertisement pages here are also of particular interest to the showroom furnisher.

Heating and Ventilating Engineering is very fully treated, but it is disappointing to find no mention of radiant panel heating by gas; suspension type radiant panel gas heating, suitable for large halls and industrial premises, should be more forcibly brought to the architect's notice.

The "Gas Engineer" has become "Gas Fitter" in the latest issue of "Specification" and occupies a very small trade division compared to the Electrical Engineer division which, as usual, is better supported by the trade announcements of electrical apparatus manufacturers.

On the whole a most useful publication, "Specification," 1937, should find its way into the library of most progressive gas undertakings.

Athletic and Social

Gas Undertakings' Small Bore Rifle League.

Up to Feb. 12 the following is the position in the Gas Undertakings' Small Bore Rifle League:

Team.	Shot.	Won.	Lost.	Drawn.	Points.	Aggregate
Portsmouth "B"	10	9	1	..	18	5 865
Portsmouth "A"	10	8	2	..	16	5 899
Beckton "A"	10	8	2	..	16	5 852
Hull "A"	10	7	3	..	14	5.838
Hull "B"	10	6	4	..	12	5 647
Beckton "B"	10	4	6	..	8	5 734
Folkestone	10	3	7	..	6	5,798
Harrow	10	3	7	..	6	5.146
Tottenham	6	2	4	..	4	3,446
Cambridge	10	..	10	..	..	5,648

Weston Co-partnership and Pension Fund Meeting.

Long-service certificates were presented to six employees of the Weston-super-Mare and District Gas Company at their Annual Co-Partnership and Pension Fund meeting on March 8. The certificates were awarded in each case for twenty-five years' loyal and faithful service, and in making the presentation Mr. Henry Butt, J.P., C.C.—who was supported by Col. Gordon Flemming, O.B.E., M.C., D.L., and Mr. James Taylor (General Manager)—stated that it gave him considerable pleasure to undertake that duty. He thought it spoke volumes for the good feeling which existed between the Company and its employees that they were able that evening to compliment no fewer than six employees upon loyal and devoted service over a combined period of 150 years. He was sure that the very handsome illuminated certificates, which were framed in heavy gilt, would be valued by those who had earned them for many a year, and would become something of a family heirloom.

The recipients, who suitably acknowledged the awards, were as follows: Messrs. S. W. T. Gagg, W. A. Hawkins, E. F. Hoffman, W. H. Jervis, F. A. Knight, and J. F. Marlow (Secretary to the Company).

Mr. Marlow, returning thanks for his award, gave some very interesting figures dealing with the expansion of the Company between the years 1911 and 1936.

South Metropolitan Company's Lambeth Lighting Improvements

A comprehensive installation of gas street lighting, which was inaugurated by His Worship the Mayor of Lambeth on the evening of March 22, will, on completion, make Lambeth one of the best illuminated Boroughs in the Metropolis.

It was in December, 1929, that high-pressure gas was first adopted for public lighting in the South Metropolitan Gas Company's area of supply, when the Lambeth Borough Council decided to re-light Brixton Road—a length of 1½ miles. Since then the lighting in many other of the main thoroughfares has been similarly modernized, and when the present contract is completed there will be some 850 "Supervia" high-pressure gas lamps illuminating 23 miles of thoroughfares in the Borough.

It was clear from the remarks of the Mayor at the inauguration that Lambeth is one of those enlightened boroughs which regard adequate street lighting not merely as a matter of paramount national importance from the aspect of road safety, but believe, in addition, that healthy rivalry between the two alternative sources of lighting, without that inherent bias inevitably associated with ownership of one or other of the supplies, enables the systems to be judged upon merit alone and a method chosen which is in the best interests of the ratepayers. For this reason it is all the more gratifying that gas should have been selected as the medium for this extensive programme of street lighting improvement, involving as it

Alderman E. A. Mills (Mayor of Lambeth) Inaugurating the New High-Pressure Lighting in Tulse Hill. On his left is Mr. Dowell (Chairman of the Borough Lighting Committee).

does an additional 8¾ miles of high-pressure lighting in the Borough, for which over 300 "Supervia" lamps will be required.

The new lighting has been designed and laid out to comply with the Standards of the British Standards Institution—the principal roads being illuminated according to the Class E Specification, and the remaining roads to Class F.

Previous high-pressure gas lighting of certain main roads consisted of 537 lamps, and all these are being replaced by "Supervia" fittings. For additional high-pressure lighting a further 304 lamps are being installed, and these are mounted at 25 ft., with an overhang of 6 ft., and at 180-ft. intervals. Three district compressing stations serve to compress the gas to the required pressure of 81 in. W.G., and all the high-pressure lamps in the area light up instantaneously.

The side street lighting which is now being replaced by 70 miles of low-pressure "Supervia" lamps was installed in 1929, when the inverted pre-heated pattern burner was substituted for the upright type. Automatic clock controllers were introduced at the same time. When the new lighting has been installed the number of low-pressure lamps in use will be approximately 3,500. These are mounted on special "Eddystone" columns, with swan necks, giving a height of 14½ ft. to the mantle, and staggered at 110-ft. intervals. The clock control is, of course, retained on the new system.

The Inauguration.

His Worship the Mayor of Lambeth (Alderman E. A. Mills) inaugurated the new high-pressure system by turning on the lamps in Tulse Hill, in the presence of a large gathering of members of the Lambeth Council and prominent local representatives. Subsequently the party were the guests of the South Metropolitan Gas Company on a motor coach tour round the newly lighted area, when those present were enabled to judge for themselves how well the Company had fulfilled their side of the contract and how excellently gas can supply the requirements of good street lighting.

At the conclusion of the tour the party were entertained by the Company at the Bon Marché, Brixton, where they were welcomed by Mr. T. W. PRIESTLEY (Managing Director of Bon Marché). Dark corners, he remarked, never sold goods and dark streets did not attract people. For that reason he welcomed a scheme which would help to make the streets brighter and bring the shopping public into the Borough. He therefore congratulated the Mayor and the Borough Lighting Committee upon the improvements.

Mr. E. V. EVANS (Joint Manager of the South Metropolitan Gas Company) thanked the Mayor for having inaugurated the new lighting system. The South Metropolitan Gas Company were very proud, he said, to have been entrusted with the lighting of the majority of the Borough, and he felt confident they would not regret having given the Company this contract, because when the installation was completed the Borough would be one of the best lighted in the country. Their Lighting Committee had set a very high standard, and, although they had done wisely, Mr. Evans felt that the poor motorist, having driven through the Borough, would wish that others were illuminated equally well. The system of lighting they had adopted was a first-class invention and was very simple, being designed to throw the light in two directions along the road, with no waste of light on the fronts of houses or in gardens where it was not wanted at all. This was achieved by the use of a long narrow flame and mantle, the latter being produced in the Company's own mantle factory. Mr. Evans referred to the happy relations which existed between the Borough and Company, and emphasized that it was always the desire of the Company to be at their service. In this connection he mentioned particularly the case of a tenement building in the Borough in which the Company had been given an equal opportunity to their competitors to obtain business. That was all they asked for—equal opportunity. In conclusion, he thanked the Mayor once again for the part he had played in their little ceremony.

HIS WORSHIP THE MAYOR OF LAMBETH thought they would all agree that the new system would take a lot of beating. In his capacity of Mayor, went on Alderman Mills, he had the doubtful pleasure of having to attend every Committee, and on the Lighting Committee he had found considerable differences of opinion as to the merits and demerits of both gas and electricity. But the Borough of Lambeth had always been ready to try anything that was good, and they had reached the state they had by virtue of the fact that, instead of rushing into the first thing, they had always examined the position carefully. He ventured to think that they had not yet reached a stage when it could be definitely stated that gas or electricity was better for street lighting; and therefore the Borough intended to maintain this healthy rivalry between the two. In tackling this question in the way they had they would eventually become the best lighted Borough in London.

Lambeth was the first Borough South of the Thames, observed the Mayor, to adopt high-pressure gas lighting, and he was very glad to have had the opportunity of inaugurating the system. He could say with absolute confidence that the South Metropolitan Company had carried out their particular job of work as well as any other body he knew of, and the Company had every right to con-

gratulate themselves on what they had accomplished in Lambeth. There were many things for which the ratepayer objected to paying, but Alderman Mills was absolutely certain that if he was called upon to pay a trifle more for a system which would save lives in the Borough it was not a thing he would grumble at. At a time when thousands of people were being killed on the roads every year it was up to every municipality to do all it could to provide better lighting in order to minimize this toll.

The CHAIRMAN OF THE BOROUGH LIGHTING COMMITTEE (Mr. Dowell) remarked that such improvements were costly—but lives came first. Prior to 1929, he said, the lamps in the main roads were of only 240 candle-power; to-day they had a maximum candle-power of 4,000, and he thought they could claim to have made great strides in this respect. This improvement would have been undertaken two or three years ago, had not the Committee been waiting for a lead from the Minister of Transport; it was only comparatively recently that the Interim Report on Street Lighting was issued, and Lambeth had done what had been recommended in instituting Class E illumination in the main roads and Class F in the side roads. When the whole system was completed they would have one of the best lighted Boroughs in the Metropolis.

Low-Temperature Tar Acids as Raw Material for the Plastics Industry

By W. D. Spencer, Ph.D., F.I.C.

Within the last 30 years a new industry of major importance has been established, the production of synthetic resins of the phenol formaldehyde type. This industry has expanded with great rapidity, especially in the last few years, until at the present time sales have reached approximately 15,000 tons per annum in this country alone, and the market shows no signs of having become saturated. Owing to the excellent electrical insulation properties of the phenol formaldehyde plastics, they are largely used for the manufacture of electrical equipment, both for large scale commercial work and for domestic appliances. In addition to this, synthetic resins are finding increasing application as a substitute for wood where a cheap mass production article is required, such as parts of motor cars, clock cases, ash trays, and other small articles. Yet another outlet for phenol formaldehyde resins is as a basis for paints and varnishes.

In view of the probable further expansion of the industry in the next few years, it is of interest to examine the supplies of raw material which are likely to be available in the future. Formaldehyde is produced in large quantities by the oxidation of methanol which is obtained synthetically from water gas produced from coke and steam, the supplies of which are virtually inexhaustible. Phenol, however, is obtained almost exclusively from coal tar, and the quantity available is strictly limited and unlikely to show any appreciable increase in the next few years. The growing shortage of cresylic acids (the crude material from which the phenols are extracted) is reflected in the price level which has risen 50% in the past year, and may be expected to rise even higher in the future. At a time of national emergency, the shortage of phenols might become serious, for large quantities would be required for the manufacture of picric acid and other explosives.

A New Source of Cresylic Acids.

At the recent Symposium organized jointly by the Plastics Group of the Society of Chemical Industry and the Institute of the Plastics Industry, Commander C. Buist pointed out that a new source of cresylic acids has recently come into existence. Large quantities of coal oil are now being produced by the low-temperature carbonization of coal, some of the distillates containing as much as 48% of crude tar acids. Low Temperature Carbonisation, Ltd., are now producing refined tar acids at the rate of 5,000 tons per annum, and there is little doubt that this quantity will be at least doubled in the next five years. A new plant is being constructed by this Company for the extraction and purification of cresylic acid from low-temperature tar, and is expected to be in operation shortly.

At the present time nearly all the cresylic acid produced in this manner is exported for use in the manufacture of disinfectants and for ore flotation processes. But in view of the limited supply of phenols from high-temperature tar that are available it becomes of interest to examine the possibilities of using low-temperature tar acids in the plastics industry. In this connection a certain amount of work has been carried out at the Chemical Research Laboratory, Teddington, under the direction of Sir Gilbert T. Morgan. Although this work can only be regarded as being of a preliminary nature, some very interesting results have already been obtained, and it has been demonstrated that no fundamental difficulty is likely to be encountered in the substitution of cresylic acids from low-temperature tar for those from high-temperature tar.

Morgan and Megson mixed together low-temperature tar fractions boiling between 170° and 230° C. and aqueous formaldehyde or paraformaldehyde in the presence of pyridine. These tar fractions contained about 45% of phenolic compounds, mainly cresols. On heating to 100° C., condensation took place with the formation of three layers, the lowest layer being the crude resin. The resin was purified by washing with benzene or with such liquors as light oil, carbon tetrachloride, and even hot water, followed by vacuum distillation. By suitably choosing the conditions the resin could be obtained in any stage between a thin liquid and a very viscous syrup. Morgan and Megson express the following opinion of these resins:

> Resins prepared in the foregoing manner have the heat-hardening properties of the ordinary trade phenol-formaldehyde resins and may be employed in suitable media for the production of laminated boards and, after incorporation with fillers, in the manufacture of moulded articles. The resins made from the phenolic fractions give remarkably pale mouldings comparable with those produced from pure phenol resins.

Data already obtained indicate that the products from low-temperature tar acids are very similar to those of a trade product.

Accelerating Hardening Rates.

At the recent Plastics Symposium, Mr. G. Dring stated that the time required for moulding these new products was much greater than was the case with the corresponding high-temperature tar acids. But in this connection it should be remembered that the moulding time for bakelite resins was originally ten to fifteen minutes; as a result of extensive research the time of hardening has now been brought down to a matter of seconds. It is reasonable to suppose, therefore, that further investigation might lead to the discovery of new accelerators which would reduce the moulding time of the resins prepared from low-temperature tar acids to a suitable value. The lack of success so far achieved in this direction may be partly explained by the facts that attempts have been made to deal with the new plastics by means of a technique which has been evolved and adapted specially to suit the ordinary bakelite resins, instead of starting from the beginning to develop entirely new methods for dealing with the new products.

Even if it were not found possible to obtain a rate of hardening for low-temperature tar resins comparable with those made from pure phenol or cresols, there is considerable scope for their development along other lines such as the manufacture of paints and varnishes, and for the construction of large laminated sheets and boards, where the time of setting is relatively less important than in the case of small articles. A slight increase in the cost of production due to a longer time of moulding might be offset by the lower cost of the raw materials.

It is clear that a strong case can be made out for extensive investigation into the application of cresylic acid produced by the low-temperature carbonization of coal to the plastics industry. It would seem to be evident that additional sources of phenols will have to be found ultimately if the present rapid rate of expansion of the industry is to be maintained.

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THE MANUFACTURE OF Cast-Iron Pipes

by P. H. WILSON, of the Stanton Ironworks Co., Ltd.

From a Paper presented to members of the Yorkshire and Manchester and District Junior Gas Associations on the occasion of a joint visit to the Stanton Ironworks Company, Ltd., on Wednesday, March 17.

The fact that in fifteen years the Stanton Company have sold over 20,000 miles of spun iron pipes goes to prove that this type of pipe is now an established product whose merits are fully appreciated by gas, water, and sanitary engineers. Stanton spun pipes are produced in sizes from 3 in. to 21 in. diameter and up to 18 ft. in length. These pipes are also made in metric sizes for countries which have adopted the metric system.

Production is carried out in three separate units, each independent of the other. The units are:

No. 1—12 machines	3 in.	to	18 in.	diam.	×	12 ft. (or 4 metres)	long
,, 2— 8 ,,	4 ,,		21 ,,	,,	×	18 ,,	,,
,, 3— 8 ,,	3 ,,			,,	×	12 ,, (or 4 metres)	,,

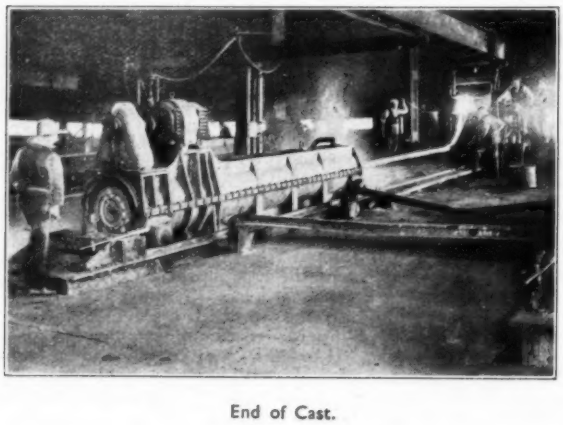
The raw materials used are systematically sampled and analyzed by the laboratory staff, who are in continuous contact with the production departments.

Measured quantities of graded pig iron, selected scrap, limestone, and coke are mechanically charged into the cupolas. Altogether ten cupolas are in work, each having a melting capacity of 10 to 15 tons per hour. They operate on the continuous tapping principle, the molten metal being discharged into receivers. The molten iron at a temperature of about 1,400° C. is run from the receivers into 50 cwt. casting ladles, which are conveyed into the casting shops by overhead electric telpher cranes.

The casting shops consist of a platform, with batteries of machines on one or both sides. The overhead telpher truck is located in such a position that the ladle conveying the molten metal is in alignment with the head of each machine.

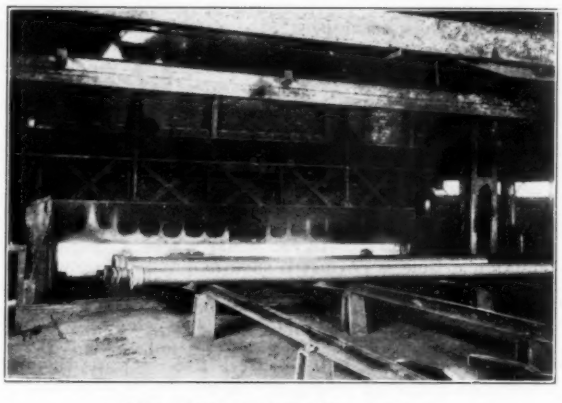
The casting machine consists of a water box containing a steel mould rotating on friction rollers and driven by an electric motor. This mould is accurately machined, the inside conforming to the outer profile of the pipe. The moulds are manufactured from special steel, the composition of which is the result of innumerable tests and wide experience.

The water-box containing the mould is mounted on rollers, and is traversed along a steel track on the machine bed, which is slightly inclined. This movement is actuated by means of a hydraulic cylinder and ram, the latter being attached to the underside of the water-box.



End of Cast.

The speed is controlled within very narrow limits by means of a fine adjustment valve. At the upper end of the incline bed is a frame to which is attached at the back a tilting hopper, which has a metal-carrying capacity sufficient to cast one pipe. On the other side of this frame is a fall spout leading to a long cantilever pouring trough. The tilting hopper, which is hydraulically operated, is shaped so that during casting the molten metal is discharged to the mould at a uniform rate. The machine is also fitted with a device to apply a thin coating of ferro-silicon powder to the mould during the casting operation.



Pipes Entering Normalizing Furnace.

The procedure for casting a pipe is as follows: A sand-core to form the inside of the socket, is inserted in a taper seat at the socket end of the mould, and the water-box is then moved up to the top of its track. The mould is revolved and the hopper, which has previously been filled with molten metal, commences to tilt. A uniform stream of iron flows down the fall spout and trough and is projected into the mould at the socket end. When the socket portion is full, the water-box travels in a downward direction. Due to the combination of the axial and circumferential movements, a continuous spiral of molten iron is deposited on the inside of the mould, which knits together, thus forming the pipe.

It will be realized that a true pipe can be formed to any required thickness by the adjustment of these three movements. For instance, having determined the correct peripheral speed of the mould (*i.e.*, that which exercises sufficient centrifugal force to hold the metal against the wall of the mould), and knowing the rate of discharge of the tilting hopper, the speed of traverse is adjusted to suit the thickness of the pipe.

The pipe is discharged from the mould by inserting internal grip tongs into the socket end of the pipe and moving the machine once again to the upper part of the track. During this operation, arms automatically function, temporarily supporting the pipe until it is picked up by a transfer mechanism and deposited on to an adjacent gantry. The pipes roll along this gantry to a normalizing furnace.

The normalizing furnaces are heated by producer gas. The bed is inclined and suitable transfer gear carries the pipes through at a rate which allows the pipes to reach a temperature of 1,700° F. and then to cool off to 500° F. before emerging from the furnace. Transit through the furnace occupies about 30 minutes.

Finishing Processes.

After leaving the furnace, the inside of the pipe is scrubbed by a pipe-scouring machine, after which it is carefully inspected and then passed on to the dipping tanks, where it is coated. No preheating is necessary, as in the

case of sand-cast pipes, spun pipes being still hot at this stage of manufacture.

The pipe is then hydraulically tested, after which it is ready for despatch.

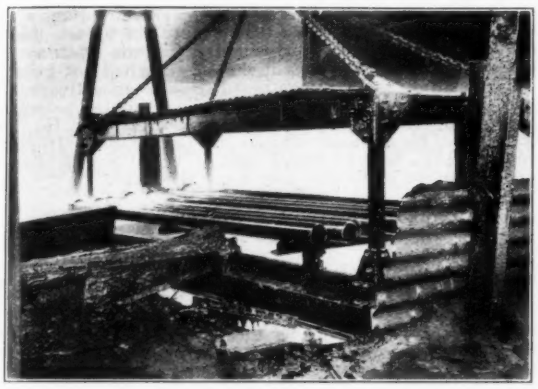
The system of casting in a water-cooled metal mould achieves two important factors:

(1) The metal is cast under pressure by centrifugal force.

(2) A high rate of solidification is obtained.

The resultant effect is to give a dense and extremely fine grained structure free from any gaseous inclusions.

In the original De Lavaud system the high rate of solidification actually chilled the outer layer of the pipe necessitating subsequent annealing. The Mairy system provides an insulating layer between mould and metal which enables the casting to be produced without chill. Annealing is no longer a necessary factor, but, as already described, the pipes are reheated or normalized. The normalizing removes casting strains and stabilizes the crystalline structure. The structure consists partly of interlaced dendrites and partly of an extremely fine



Dipping Spun Pipes.

crystalline form in which the graphite, in its matrix of ferrite, is evenly dispersed in small particles.

The foregoing considerations indicate that the pipe will possess superior mechanical strength to one cast in sand. Spun metal has a tensile strength of 16 to 20 tons, whereas the same metal cast in sand would only carry 10 tons per sq.in. Resistance to transverse loading is greatly enhanced, and with the advent of the Mairy process resistance to impact is raised to a degree not previously associated with any type of cast-iron pipe. Resulting from these superior mechanical properties the new spun iron pipe is made some 25% thinner than the sand cast pipe and yet provides a higher factor of safety. The resistance to impact is a most important factor to the user, and implies the almost complete elimination of laying or receiving a pipe damaged by transit or handling. This is determined at the works on test pipes by repeated increasing blows delivered by a 50-lb. weight.

The Stanton-Wilson Self-Adjusting Joint.

An aspect of the traffic problem relative to underground mains is of considerable moment to gas engineers—namely, the necessity of protecting these mains from the effects of the increasing vibration set up by heavy traffic. To meet this problem and also to provide for ground subsidence, the leading pipe manufacturers of Great Britain, Europe, and America have in recent years introduced various types of flexible pipe-joint, which have met with a considerable degree of success. Judging by the Stanton Company's experience with the Stanton-Wilson self-adjusting joint, which was designed for use with spun iron pipes, a growing number of engineers are realizing that a well-designed mechanical joint is no less efficient than a lead joint, over which it offers a number of very definite advantages. For example, the principal advantages claimed for the Stanton-Wilson joint are that it gives mains a flexibility which enables them to resist the effects of ground subsidence and traffic vibration; it can be assembled by unskilled labour in a fraction of the time required to make a caulked joint; and it has a positive action on the joint-ring, remaining leaktight irrespective of the degree of internal pressure within the pipe.

Some idea of the popularity which this joint has attained among users of cast-iron pipe may be gathered from the fact that over 515,000 Stanton-Wilson joints, representing about 1,500 miles of spun iron pipes, have been supplied during the last six to seven years. The repeat orders in themselves represent over two-thirds of this total mileage, and, as further evidence of the general adoption of this joint, over 700 undertakings have used it with satisfaction and success.

The Stanton-Wilson joint consists of two loose parts only —a cast-iron collar or locking-ring, and a rubber joint-ring, V-shaped in section, which is protected from the fluid in the main by a lead sheath. This ring is compressed by the locking-ring, which holds it in place between the spigot of one pipe and the socket of the other.

The socket of the pipe has three external helical lugs which engage with three similar lugs on the locking-ring. Clockwise rotation of the locking-ring causes it to move axially and so compress and secure the joint-ring in position. In actual practice the locking-ring is rotated by a simple and easily detachable rack-and-pinion device.

When rubber is kept in compression and protected from light and air in this manner it can be relied upon to last for many years without deterioration. The Research Association of British Rubber Manufacturers has carried out comparative tests on modern rubber joint-rings, and on similar rings which have been in actual use in pipe-joints on gas mains for over forty years. The old rings were found to be still capable of maintaining leaktight connections, and to be little inferior in strength and resiliency to the modern rings, which were made of a higher grade of rubber.

The Stanton-Wilson joint can easily be assembled in a limited space, and under conditions which would make caulked lead jointing an extremely slow and laborious operation. If necessary the joint can be made below water. The joint can be deflected to an extent of approximately 5° in any direction, remaining leaktight before and after deflection. It also serves as an expansion joint, permitting about 2 in. free longitudinal movement at each coupling.

The flexible and expansion properties of this joint greatly simplify the technique of main-laying. Easy curves can be taken without special bends; where necessary the pipes can be jointed above ground surface and subsequently lowered into position; and also the rapidity of jointing permits full advantage to be taken of modern excavating machinery. The joint can easily be dismantled without damage to its components, and is therefore ideal for temporary mains. The Stanton-Wilson joint has been found to be particularly effective in areas where frequent ground subsidence due to mining has caused serious damage to rigidly-jointed mains. Many gas undertakings have used and are using the joint for distribution and high-pressure mains.

The Stanton Mechanical Lead Joint.

The Stanton Company have recently introduced an all-lead mechanical joint which is offered as an alternative to the ordinary caulked or turned-and-bored pipe joint.

Stanton-Wilson Main.

Being mechanically made, this joint does not depend for its efficiency on the individual skill of the workman. It can be made by unskilled labour in a few minutes, even under the most adverse conditions. When conditions are favourable the joint can be assembled in one minute only.

This increased speed of jointing, coupled with the fact that less excavation is necessary, considerably reduces the cost of laying.

In the Stanton mechanical lead joint a special pre-cast wedge-shaped lead-ring is positively compressed into a machined taper recess. This ring is secured by external half-collars, which are tightened by high-tensile cast-iron screws. The screws, which are in compression, are so placed that uniform pressure is applied to the whole periphery of the joint-ring. Obviously this is an improvement on the run lead joint, in which the lead is liable to contract so that it cannot tightly fill the space between socket and spigot. Only about ½ in. of the lead is compressed by caulking. As the joint-ring is mechanically held, it cannot be dislodged by movement of the spigot. In the centre of the lead-ring is cast a corrugated spring steel ring. This transmits the end pressure throughout the full depth of the lead-ring, causing it to make uniform contact.

While a high degree of flexibility is not claimed for this joint, it will withstand a greater amount of traffic vibration than a caulked or turned-and-bored joint, and may therefore be used under conditions which would cause leakage with one of the latter types of joint.

Discussion.

Mr. F. BEAUMONT (Huddersfield) asked if the Stanton Company had got over the difficulty of the chilled surface of the pipe. The Delavaud pipes had a chilled surface, which turned up the average tool, but once one had got through the surface, the inner portion might be described as "mush." Had this difficulty been surmounted?

In reply, Mr. WILSON stated that the trouble had been overcome by the new spun pipe, and anyone could take a hammer and chisel and make a practical test during the afternoon tour of the Works. The spun pipe now produced has a dense structure, high tensile strength, *plus* an entirely new quality—namely, ductility, which increased its resistance to impact stresses or shock to at least 50% above that of the thicker vertically-cast iron pipe. The density of the metal was very largely due to the rate of set during the cast, and not to centrifugal force.

A MEMBER asked Mr. Wilson why he had mentioned concrete lamp columns, but did not refer to spun iron lamp columns. Was it not possible to make spun iron lamp columns?

Mr. WILSON said that the only difficulty was the limitation of suitable designs, but lamp columns were made of the spun iron. In reply to a further question, Mr. Wilson stated that whereas some concrete pipes were reinforced and others were not, all lamp columns were reinforced.

Mr. HASLAM (Bolton), in calling attention to the fact that the metal was not so thick in the spun pipes, enquired if the question of corrosion would not be more serious with this class of pipe. In other words, a thicker pipe would be better.

Mr. WILSON replied that accelerated tests had been carried out for the purpose of ascertaining the effects of corrosion, but, as a rule, such tests could be relied upon. The information available was that spun pipes resisted corrosion to a greater extent than sand cast. There were, of course, two classes of corrosion—*e.g.*, corrosion by electrolysis and corrosion due to the nature of the soil. There was also a combination of the two. The main cause, however, was electrolytic, the graphited carbon in the pipe forming one of the poles. In the case of sand cast pipes there were large patches of graphite, whereas it was more distributed in the spun pipe, hence there was less possibility of corrosion. A micrograph of the two classes of pipes would show the difference very clearly.

Mr. R. N. WEBB (Leeds) referred to the fact that he was present in a dual capacity. First, in his new position as President of the Manchester District Association of Gas Engineers, and, secondly, as an old member of the Yorkshire Juniors. He would like to say how pleased he was to see at the meeting Mr. A. L. Holton (Manchester) and Mr. G. Dixon (Nottingham). The fact that they were present showed they had not forgotten their junior days and still continued to show an active interest in the Junior Associations. He was also delighted to see present so many Past Presidents of both Associations. He would like to add his personal thanks to the Stanton Ironworks Company, Ltd., and he hoped that it would not be the last time the Juniors would pay a visit to the Works.

Vote of Thanks.

Mr. A. K. COLLINGE (Preston) proposed a vote of thanks to Mr. Wilson, not only for his Paper, but particularly for the full replies he had given to the questions which had been asked by the members. Mr. J. RICHMOND (York) seconded the vote of thanks. Mr. WILSON, in reply, stated that he would be pleased to answer any further questions by letter, on request from any member.

Wandsworth and District Gas Company's Bill

The Unopposed Bills Committee of the House of Commons, over which Captain R. C. BOURNE (Chairman of Ways and Means) presided, considered the Bill promoted by the Wandsworth and District Gas Company on Tuesday, March 23.

The Bill was promoted to give an opportunity for the revision of the Company's basic price (as required by a previous Act of the Company), to authorize the conversion and consolidation of 5% preference stock with the existing 4% preference stock on the basis of the issue of £125 of 4% stock for £100 of 5% stock, and the raising of additional capital.

Mr. ARTHUR J. LEES (Messrs. Lees & Co., Parliamentary Agents), for the Company, said that the Bill was promoted in accordance with the provision of the Company's Act of 1929, to the effect that not later than the session 1937 a Bill should be promoted in Parliament proposing a revision of the basic price or giving an opportunity for such revision to be made, and that the Council of any county, borough, or urban or rural district within or partly within the limits of supply should be entitled to be heard. The Company's standard price as fixed by the 1929 Act was 11d. per therm. That was also the basic price fixed for the South Metropolitan Gas Company in 1920 and confirmed in 1925, for the Commercial Gas Company in 1927, for the South Suburban Gas Company in 1928, and for the Gas Light and Coke Company in 1931. There had been many opportunities for revising the basic price of those other companies, but nobody had suggested revision.

With regard to the present Bill, all the local authorities concerned, other than the London County Council (they were the Surrey County Council, the Metropolitan Boroughs of Wandsworth and Battersea, four municipal boroughs, and about 14 urban districts) had stated that if it included a provision to give another opportunity for the revision of the basic price in a few years they would not oppose. The Company had agreed to promote a Bill for that purpose five years hence; it had also agreed that within that five years it could not possibly utilize the £1,250,000 additional capital asked for by the Bill originally, and, therefore, it had reduced the additional capital powers to £375,000. The local authorities referred to were satisfied.

The London County Council, however, had presented a petition against the Bill, asking that the Bill should provide a further opportunity for revision of the basic price, that the capital powers asked for should be reduced, and that there should be some discussion of what might happen after the Gas Prices Committee had reported. The Company had suggested that the County Council should withdraw its petition, without prejudice. Thus, of the 20 authorities, not one appeared to suggest an alteration to the basic price or to object to the Bill.

The CHAIRMAN pointed out that the Company proposed to issue £125 of 4% stock for every £100 of 5% stock, the extra £25 being in consideration of the reduction of 1% in interest. That would enable the Company to borrow to a larger extent. He asked why the Company wished to do that. (The Company asked for 60% borrowing powers.)

Mr. LEES replied that any number of companies had done it in the past. As the result of converting the 5% into 4% preference stock an addition of £25 was made to every £100 of stock. That did not give the stockholders 25% more interest; but it increased the capital and enabled the Company to raise more by debentures than it would be able to raise by that means otherwise. The advantage was that debenture stock could be raised on better terms than preference or ordinary; that was to the advantage of everybody, and chiefly the consumers.

The Bill contained a clause whereby the Company must promote another Bill in 1942 to give an opportunity for the revision of the basic price.

The Bill was ordered to be reported for third reading.

The Colonial Gas Association

Dividends and Exchange Rate

At the Meeting of the Directors of the Colonial Gas Association in Melbourne interim dividends were declared for the half-year ended Dec. 31 last at the rate of 4%, less income-tax, on the Preference Shares, and at the rate of 3%, less income-tax, on the Ordinary Shares.

Exchange will be deducted from these dividends at the rate ruling on the date the dividend was declared—viz., £100 in London for £125 10s. in Melbourne.

The dividends due to shareholders on the London register will be payable in London on April 3 next, but where instructions to that effect have already been given to the Association, the dividends due to such shareholders will be paid in Australia to a Bank there on their behalf, or to an accredited agent. It is not necessary to renew these instructions, the dividend being paid in accordance with such instructions until further notice is given by such shareholders.

Jottings from Burton-on-Trent

From a Paper presented to members of the Midland Junior Gas Association at a meeting held on March 4—the PRESIDENT (Mr. F. A. Jenkins, of Leamington) in the chair.

by
H. WYNNE
(Engineer and Manager of the Burton-on-Trent Corporation Gas Department)

In view of the fact that a visit to Burton-upon-Trent has been arranged, I do not at this juncture intend to give *in extenso* a detailed description of the plant that we have in use, but just to mention a few salient features.

We have both coal gas and water gas plants, and at present we are using our horizontal retorts together with our water gas plant, which latter was erected by Davison & Partner. It is our practice to dilute with blue water gas, keeping the mixture as constant as possible in regard to gravity, calorific value, and composition. This latter factor is very important, and sometimes is overlooked, as trouble has occurred, particularly in installations where thermostatic control is in use.

In my view, the old adage "Profits are made or lost in the retort house" is still as true to-day as ever it was, because any dissatisfied consumers can do an incalculable amount of harm. It behoves all of us to see to it that a level quality of gas is distributed, not only for the sake of our domestic consumers, but also in the fields of industry, which load we all need to foster as a means for our own salvation in keeping down our capital costs.

An adjunct to the Industry is that of gas drying, which is also very important. The Industry has lost many consumers by the nuisance of water-logged services, and excessive troubles with naphthalene deposits. At Burton we favour the "Glycerin" process. Time would not permit, and it would be quite irrelevant to discuss the advantages and disadvantages of the rival plants for gas drying. Suffice it to say that gas drying is very essential if we are to give the best service possible.

For the efficient working of any undertaking the quality of the raw material must be regularly and efficiently tested. The laboratory tests are extremely helpful, but, generally speaking, owing to the small amount of sample that can be tested, the results obtained are not always reliable. A coal testing plant is therefore desirable, but it is impossible for us to erect such a plant as, say, the Birmingham Gas Department, where very accurate results are obtained under ideal working conditions. However, we have devised a very useful testing plant, where the weight of coal tested is 22·4 lb., or 1/100 part of a ton. The retort is horizontal, D-shaped, 4 ft. 6 in. by 9 in. by 9 in., and made of cast iron. It is direct fired and heated by means of coke. There is a hydraulic main, which is connected to a coil condenser, ammonia washer (which is simply a 9-in. pipe packed with pebbles, down which a determined amount of water is used), a small oxide purifier, together with a meter and a 150 cu.ft. gasholder. This latter was designed to throw 2 in. w.g. pressure, but during the time the plant is working, it is counterbalanced by weights to give only 0·5 in. w.g. By this means the use of a small exhauster is eliminated. Very reliable results can be obtained by this practically home-made plant, and to simplify matters all collecting receptacles are calibrated into 1/100 gallon divisions, thus making it possible to interpolate directly into gallons per ton.

Coming to our purifiers, they are four in number and are made of reinforced concrete, submerged in the ground, being of the dry-lute type, and are 40 ft. by 40 ft. by 6 ft. To each of the boxes we have four steel lids, each 15 ft. sq., the lids being raised by a travelling hand-propelled crane. Regarding the purifying grids, these have been designed so that each grid is the same size—viz., 4 ft. by 2 ft. I mention this point particularly for the notice of young engineers, as the grids I have seen used in connection with some designs of boxes, have been a veritable Chinese puzzle. In designing, always arrange for simplicity whenever possible, as, generally speaking, efficiency follows simplicity.

Policy Towards the Consumer.

So far as policy towards our consumers is concerned, some three years ago a census of all apparatus on consumers' premises was made, and this has since proved to be very valuable. All maintenance schemes, circulars, canvassing, &c., are based on this, and a similar scheme may be recommended to any distribution department who feel they would like their finger on the pulse of things.

Reverting to the domestic position. It is the policy of the Department to place an enamel cooker on permanent hire, in addition to hire-purchase of the leading makes. Black cookers, which have seen their day, are ruthlessly scrapped since an out-of-date appliance may well mean the failure to obtain further appliances in a house. Sink water heaters are hired at a moderate rate, and modern fires, radiators, and any other domestic appliance may be also hired.

Space heating has received a considerable amount of attention of late, and our central heating load embraces churches, factories, warehouses, offices, shops, and private houses. A preferential rate is given for this purpose. This also applies to greenhouses, as we have a number of these attached to private houses, in addition to one large installation which is being run on a commercial basis. As far as possible all installations are thermostatically controlled. The Gas Department co-operates with the heating engineers on heating problems, and no work is undertaken which will deprive the heating engineer of any profit. The industrial load, which serves a diversity of trades, including malt roasting, metal melting, canning machinery, stoves for firing abrasive wheels, glass works plant with its lehrs, gloryholes, &c., is growing, a 24% increase being reported on this side of our business last year, and to this we look for the consumption which will replace the lighting load. A maintenance scheme is carried out in connection with lighting, and we have switch-operated gas lighting in several schools. We definitely do lose lighting consumers because of the all-electric wireless sets, but in view of a certain advertisement last week in one of the National daily newspapers it should give those who think that all is lost in this direction some ray of fresh hope. The gist of this advertisement was that gas-lit homes could have radio sets working as good as an all-electric set by using a certain supply unit. It is certainly not the practice at our meetings to give free advertisements, and quite rightly so, but this advertisement most certainly struck me as being very useful to us as a means of helping to keep what lighting consumers we have. I think we do not press home sufficiently the fact that gas lighting is also useful as a source of heat.

Coming now to the subject of costs. We are all agreed that this needs very careful scrutiny. To await the end of the financial year before one knows the position of an undertaking is quite a suicidal policy. It behoves us all to ever keep an eye on our accounts, and although it is very unwise to adopt a cheese-paring policy in regard to staff, repairs, painting, and buying the cheapest article without duly considering its efficiency, yet it is very essential to examine our costs at frequent intervals. We have instituted a monthly manufacturing cost statement (a copy of which can be seen), which embraces the cost of raw materials, residuals, and wages. The latter is subdivided into manufacturing, by-products, repairs and maintenance of works, management, and distribution.

The previous headings of wages being subdivided as follows:

Manufacturing.

Stoking, purification, boiler and exhauster attendant, coal and coke handling, water gas manufacture.

By-Products.

Dehydrated tar, ammonium sulphate, concentrated liquor.

Repairs and Maintenance of Works.

Odd labouring, works maintenance.

Management.

Engineers and office staff.

Distribution.

Mains and services, meters, stoves, and fires.

Although this statement is not intended to be a full balance-sheet, yet it is extremely useful for comparison

purposes, as any big variation in any of the items can be dealt with immediately. Also on this cost statement is shown the various stocks being carried of coal, gas oil, by-products, lime, and new and spent oxide. Various statistics are given, such as make per ton of coal, number of retorts at work, average cost of gas and therms per ton of coal, together with the yields of the various by-products. We also extract the number of meters and gas appliances which are fitted every month.

Coal Contracts.

Regarding our coal contracts, the position of these are recorded on our cost statement, which is very useful as a check on the quantity that should be delivered month by month. While dealing with coal contracts, we test all our contract coals in the coal test plant every quarter, and all the results are collated to see if there are any appreciable variations as compared with results obtained from previous tests. Where this occurs, a complaint is immediately made to the factor.

Leaving the points concerning the general management of a works, I should like to touch upon some original work which was done under the guidance of my predecessor and Chief, Mr. William Wilson, now of the Caledonian Gas Corporation. It dealt with the manufacture of ammonium bicarbonate and total gasification. Regarding the former, a patent was obtained by him for a process to unite the carbon dioxide in gas with ammonia in the form of concentrated ammoniacal liquor. This particular process has been reported in the Transactions of The Institution of Gas Engineers. I mention this question of the manufacture of ammonium bicarbonate as it seems to me that it opens up a vast field for research. Not only is it another compound other than ammonium sulphate, which can be produced successfully on a gas-works, but it is a means of reducing the diluent carbon dioxide in gas which in itself is to be desired, particularly as we have to sell gas on a heat basis and not by volume.

Talking of carbon dioxide, do we realize the enormous amount of this gas some Works put through their meters, and what a potential source of revenue this would be if only a portion could be reclaimed for producing " dry-ice."

Our experiments on total gasification were an attempt to make a dual quality of gas from one producer. Needless to say, we were not entirely successful, but we were definitely convinced that there might be something in the project. As we only had our water gas plant with which to experiment, it was not a plant specially designed for the purpose, and our experiments were conducted with non-caking nuts. Owing to local exigencies we were not able to continue with our experiments, so no reliable figures could be obtained. Here again, if research could be continued and a successful issue arrived at, then cheap gas suitable for many industries could be made, together with a quantity of gas suitable for general town use.

It may be very idealistic, but the last word in coal carbonization has definitely not been said. Why do we all spend so much on capital outlay for our carbonizing plants for such a comparatively low yield of gaseous therms? The upkeep of such plant is no small item. It has been said that in the future gas-works will consist of producers. This may appear at the moment very remote, but it appears to be feasible.

Do not interpret me as favouring, for all purposes, a low grade gas, but I am thinking of a producer that should be so designed to give a dual quality of gas in such proportions that would make industrial gas really cheap.

Discussion.

The PRESIDENT (Mr. F. A. Jenkins, Leamington) said Mr. Wynne had mentioned at some length the effect of wireless upon the demand for gas lighting, and it was cheering to hear of the advertisement of a wireless appliance which made distinct reference to gas lighting. With regard to the monthly manufacturing cost statement, he asked whether this covered a calendar month or was a four-weekly statement.

Mr. E. T. PICKERING (Birmingham), in proposing a vote of thanks, said many of the Members would remember Mr. Wynne when he was with the Birmingham Gas Department, and the valuable work he did in connection with the inclined system of carbonization and the development of the Brooks slide. They were doubly indebted to him because this was the second Paper he had given to the Association. He asked whether at Burton-on-Trent the water gas and coal gas were automatically mixed and whether Mr. Wynne had experienced any difficulty in connection with gumming troubles. He was very interested in the question of testing of coal. He agreed that to some extent small scale laboratory tests left something to be desired, but, on the other hand, when used by someone skilled in manipulating small apparatus and if sufficient care were taken in preparing samples, reliable results could be obtained. He asked what means were employed to get rid of the last traces of tar, which was a most difficult object to achieve.

Mr. A. W. ATTWOOD (Coventry), in seconding the vote, said that Mr. Wynne had stressed the importance of the satisfied consumer, and he was of opinion that this was more essential than ever in view of the fact that the Government were about to bolster up the electrical industry further and help them to bring down their charges for electricity. He asked if Mr. Wynne had any experience with the flat bar type of grid such as the " Simplex." He agreed that it was bad policy to use cheap articles, and this applied particularly to painting on gas-works. Of the cost of painting 75% to 80% was in respect of labour, and to use cheap paint for the job was a great mistake.

Mr. R. S. RAMSDEN (Leamington) said, while he agreed that profits might be made or lost in the retort house, the men on the distribution side also affected this, and he stressed the importance of a proper approach to consumers. A tactless fitter or representative could do untold harm to an undertaking.

Mr. S. BROCKBANK (Walsall) noticed that in Burton they had a very satisfactory central heating load, and asked whether a bigger concession was given for gas used for this purpose than for that used for industrial purposes. With regard to the question of eliminating carbon dioxide he thought it would be better to approach the subject from the standpoint of prevention during gas manufacture rather than removal afterwards.

Mr. J. H. WAINWRIGHT (Halesowen) asked what percentage of water gas was admitted and what was the specific gravity of the gas at times of normal admixture. He also asked if benzole could be extracted by means of the " Glycerin " process. He asked this in particular reference to the sulphur content in gas; with a suitable benzole extraction plant a figure of 10 grains per 100 cu.ft. could be obtained. He asked if Mr. Wynne had been able to obtain with a cast-iron retort, a temperature anywhere near 1,100° C., which was the customary temperature with horizontal retorts. He also asked at what price per therm gas could compete with coke for greenhouse use.

Mr. H. S. GARVEY (Birmingham) referred to the question of maintenance and asked if this were done free of charge and whether inspection of consumers' appliances was carried out bi-annually or annually, or whether it was left to the consumer to make application.

Mr. W. MCNAUGHTON (Wolverhampton) referred to the question of concrete purifiers, and asked what was the maximum temperature at which the boxes were worked at Burton. With regard to the statement of costs, he thought that with a monthly cost sheet the information was out-of-date by the time it was available, and, in his opinion, a weekly cost sheet would be the easiest way of watching a particular item of expenditure.

The Author Replies.

Mr. WYNNE, replying to the discussion, said that the advertisement to which he had referred was not a means of increasing gas sales but should help to hold lighting consumers. With regard to the monthly statement of cost, a calendar month was taken because all the goods received were calculated up to the end of a calendar month. If the end of the month did not coincide with the end of a wages week, then a proportion of the wages' costs was added or subtracted. With regard to the mixing of coal and water gas, this was done more or less by rule of thumb. They had experienced gumming troubles but not to any large extent, and most of these occurred in connection with gas fires which were electrically lighted. He agreed with Mr. E. T. Pickering's remarks regarding the small scale test plant in connection with volatile matter and ash content, for ascertaining which it was necessary to use the laboratory method. All the coals used at Burton were singles, and it was, therefore, quite easy to obtain samples. They usually took 5 cwt. out of a 10-ton truck as it went forward to the elevator. With regard to removing the last trace of tar on the test plant, no special means for extracting this had been adopted. He had had no practical experience with the use of the " Simplex " type of grid. He agreed that when painting on the works, a good quality paint should be used, as generally the ratio of labour to the cost of paint was three to one. It was essential that a good paint should be used on mains and structures, but he was not so particular in regard to the paint used on gasholders, as at Burton they made it a practice to paint and inspect the holders every eighteen months, while the holders were grounded.

With regard to gas for central heating, this was charged at the same rate as for industrial purposes, namely, 4½d. per therm as against the average price in the Borough of 10d. per therm. While he agreed as to the benefit of eliminating as much sulphur from the gas as possible, in his opinion, if clean coal were bought, this materially reduced the sulphur content in the gas. The normal quantity of water gas varied from 12% to 15%, and the specific gravity of the normal mixture was about 0·58. He considered it would be possible to extract benzole in connection with the " Glycerin " process, but it would need a separate plant.

With regard to the temperature of the cast-iron retort on the coal test plant, this could never reach 1,100° C., and the normal temperature was approximately 980° C., and this was constant for all tests. At Burton, the price of gas would have to be about 4d. per therm to compete with coke for greenhouse work. Maintenance was carried out free with the exception of gas mantles and globes, and a quarterly inspection of all apparatus was carried out. He had not experienced any undue heating up of concrete purifiers. The cost of drying the gas did not exceed ½d. per 1,000 cu.ft.

British Gas Light Company, Ltd.

The Two Hundred and Sixth Ordinary General Meeting of the British Gas Light Company, Ltd., was held at the Chief Offices of the Company, 2, The Abbey Garden, Westminster, S.W. 1, on Wednesday, March 24—Mr. HENRY WOODALL, M.Inst.C.E. (Chairman and Managing Director), presiding.

The SECRETARY (Mr. A. J. Mumford) read the notice convening the meeting, together with the Reports of the Auditors. The Directors' Report and Statement of Accounts for the year ended Dec. 31, 1936, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said: The result of the year's working is that after payment of Debenture and other Interest and the Preference Dividends there is £56,444 available. Out of this sum an Interim Dividend of 3½% has been paid; and if the usual Final Dividend of 4% be paid and £15,000 transferred to the General Reserve Fund, the balance forward will be £80,878. In spite of the reduction this year in the carry-forward it is still £2,233 higher than it was ten years ago, and during the same period the General Reserve Fund has risen from £69,136 to £200,000. In addition to our General Reserve Fund, we have Station Reserve Funds which amount to just over £70,000, and, further, there are some quite useful reserves at some of the Subsidiary Companies. Practically the whole of the Reserves are invested in Government Securities.

At Hull the Revenue Account shows a Profit of £53,461 compared with £50,380 for the year 1935 and is £91 short of the amount required for the year's Parliamentary Interest. Interest on investments, however, totalled £1,677, from which has to be deducted £110, loss on the sale of 5% Conversion Loan, the result being that after paying the full Parliamentary Interest there is a net addition to the Hull Reserve Fund of £1,476, which now totals £37,400.

At Norwich the Profit on Revenue Account amounts to £53,318 compared with £54,787 for the year 1935, and provides a surplus of £4,053 which has been added to the Reserve Fund of this Station, which now stands at £33,242. Although there was a small increase in the revenue from gas (9 million cu.ft. more were sold) the manufacturing costs, less residuals, were lower than in 1935 by £4,000—mainly due to the higher prices received for residuals. As a set-off against this, expenditure charged to distribution was £2,000 higher, and £2,000 more was written off new mains and services (£10,000 this year as against £8,000 last).

It is not necessary to give details of our other Stations, but they have done well, and in the aggregate the profits are greater than last year.

The proprietors were informed at the last Annual General Meeting that the Directors had given to the holders notice of redemption on June 30, 1936, of the outstanding £70,500 Norwich Station 7½% Mortgage Debentures. These were duly repaid and re-issued at 3½%. The transaction will result in a saving of £2,820 per annum in interest charges.

A further £250,000 of 3½% Debenture Stock was issued and placed privately in November last, the greater part of the proceeds being applied to the repayment of the temporary loan from the Company's Bankers.

The Ruthin Gas Order was made by the Board of Trade on May 6, 1936, and the Undertaking has been operated as a Station of the Parent Company since July 1, the old unlimited Ruthin Gas Company being wound up.

Fenland Difficulties.

Last year I referred to the purchase of the Thetford Undertaking. Since then we have acquired Mildenhall, which is being run as a Station, and the Littleport Gas Company. These two works are in the Fen area, and we have been a little anxious as to the effect of the serious floods now happily subsiding. I am pleased to say that there has been no interruption in the gas supply, and I congratulate the Managers on getting safely through an unpleasant experience. These Undertakings, with Brandon, have been placed under the management of the Engineer at Thetford, and encouraging results are already forthcoming from this little group. We have also added the Huntingdon and Godmanchester Gas and Coke Company to our list of Subsidiary Companies, and our controlled undertakings now comprise 14 Stations, 1 Chemical Works, 23 Gas Subsidiary Companies, and 1 Water Subsidiary Company—in all 39 separate undertakings.

We are only able to record a very small increase—0·17%—in the sales of gas for the year. This is entirely due to the reduced business at Hull, where the quantity sold was 2·64% less than in the previous year. Hull now accounts for only about half the Company's total sales of gas, and the fact that the net aggregate increases at the other undertakings were sufficient to outweigh the decrease at Hull indicates their growing importance. In this connection, gratifying increases have been obtained at most undertakings; the highest is 24¼%, but one with 14% and another with 11½% are worthy of note, and there are quite a number with from 10% to 8%.

Sales of appliances have again been extremely satisfactory, a total of 14,087, with a selling value of £89,863, having been disposed of.

The works and distribution systems have all been maintained in a high state of efficiency. In a number of cases additional plant is being installed to meet increasing demands and ensure adequate supplies to our consumers. Considerable sums are also being expended on renewal, enlargement, and extension of mains, although unfortunately in certain instances the extensions are to meet building developments consequent upon slum-clearance schemes and are therefore in the nature of replacements.

Additional premises are being acquired for showrooms to permit of the full display of the latest appliances and to bring to the notice of consumers the manifold uses of gas.

The wages of gas workers were increased from the beginning of July following extended negotiations. The National Joint Industrial Council for the Gas Industry enables such matters to be calmly discussed and decided on their merits without resort to threats on either side.

Coals.

There have been many references by chairmen of public utility undertakings to the price of coal, and the position can hardly be regarded as satisfactory. It is a pity that it appears to be accepted by many people that an increase in price is inevitable. Pit prices are in some districts on the low side. The Yorkshire pits, from which we draw practically all our coal, are, however, doing very well if one is to judge from the rise in the price of coal shares. In the circumstances, we might reasonably expect no advance in the price of Yorkshire coal.

The public utility companies—gas, water, and electricity—are working together, and our interests are being carefully looked after by most competent people.

Apart from the increase in wages and coal prices, the cost of materials and appliances generally is rising rapidly. The price of gas has not up to the present been increased at any of the Company's undertakings, but increasing costs may compel such a course.

Pensions Scheme.

It will be remembered that in 1924, to mark the Company's Centenary, the Directors decided to make provision for the workmen by instituting a non-contributory pensions scheme. Since its inception 175 employees have benefited to the extent of £46,857. There are at present 116 pensioners, and the average rate of pension is 22s. 1d. per week. At the same time we have been building up a fund to meet our future liability under the scheme. As will be seen from the accounts, this fund now amounts to the useful sum of £127,000, and our experience up to the present seems to indicate that the actuarial reports, which we obtain at regular intervals, have erred, and rightly so, somewhat on the cautious side so far as the cost of the scheme is concerned. It is a pleasure to receive from time to time letters from pensioners expressing their appreciation and gratitude.

For the officials a contributory superannuation scheme was put into force some five years ago. This is operated through an Insurance Office, and the funds are outside the Company.

In conclusion, I would remind you that we are an old Company, one of the oldest of the Gas Companies in England. We are in our 114th year, but I think we may be said to be still vigorous and enterprising. The position to-day is as sound as it has ever been. We have acquired in recent years a number of Gas Companies, and every year they show improved results and undoubtedly consolidate the whole Undertaking.

Your Directors are very conscious of the good service rendered them by the officials and the workmen. The chief officials are all young men, and it is particularly gratifying to report that when vacancies occur we are nearly always able to fill them by our own people. It has been the policy of your Board for some years past to bring in young people from the Universities and elsewhere and train them ourselves. As you know, we have a number of Undertakings, and, consequently, special opportunities for giving young men of promise chances of acquiring practical knowledge of both large and small works and early responsibility. Our policy has amply justified itself, and it gives me pleasure to say how grateful we are to those who serve us so faithfully and well. I ought to add that we now have not only officials and workmen but also an increasing number of workwomen whose services in our offices, showrooms, and on the district are indispensable and greatly appreciated.

The Chairman then moved that the Report and Accounts be received and adopted and entered on the minutes of the meeting.

The DEPUTY-CHAIRMAN (Mr. Harold G. Palmer) seconded; and in response to a question by Mr. F. R. W. SLY regarding the progress of the Company's smaller undertakings, the CHAIRMAN stated that they were profitable concerns. The Company had a large travelling staff of engineers, chemists, and accountants who were able to keep in very close touch with all their undertakings, while in their buying they were able to obtain for their smaller undertakings practically the same prices as for the larger ones. Each year, added the Chairman, the returns from their small undertakings had been slightly better—and in many cases very much better; none showed a loss, and the average return was about 7%.

The resolution was then put to the meeting and carried unanimously.

Dividends.

The CHAIRMAN thereafter moved:

That the payment by the Directors of the Dividends at the rates of 7% per annum, less income-tax, on the cumulative preference stock, and 5½% per annum, less income-tax, on

the "B" redeemable cumulative preference stock, as mentioned in their report of March 15, 1937, be confirmed.

This was seconded by the DEPUTY-CHAIRMAN and unanimously agreed.

The CHAIRMAN also moved:

That the payment by the Directors of the interim dividend at the rate of 3½%, less income-tax, on the ordinary stock, as mentioned in their report of March 15, 1937, be confirmed, and that a final dividend on the ordinary stock at the rate of 4%, less income-tax, making 7½% for the year, less income-tax, be now declared, the same to be payable on April 2 next; and that the dividend warrants be sent by post to the last known address of each proprietor, unless instructions have been received to the contrary.

This resolution was also seconded by the DEPUTY-CHAIRMAN and unanimously agreed.

Re-Election of Directors.

The CHAIRMAN moved the re-election to the Board of Viscount Mersey, being one of the Directors retiring by rotation. Lord Mersey had been a Director of the Company for eleven years, observed the Chairman. He was a very useful and valuable Director, and he cordially proposed his re-election.

The proposition was seconded by the DEPUTY-CHAIRMAN and carried unanimously, Viscount MERSEY briefly acknowledging his re-election.

The CHAIRMAN also moved the re-election to the Board of Mr. E. C. Woodall, the other Director retiring by rotation. Mr. E. C. Woodall had now been a Director for some years, said the Chairman, and it was important, in view of the large area covered by the Company, that they should have a young and energetic Director who could pay frequent visits to their works.

The resolution was seconded by the DEPUTY-CHAIRMAN and carried unanimously, and Mr. E. C. WOODALL briefly returned thanks.

Re-Appointment of Auditors.

It was also unanimously agreed that Mr. E. Knowles Corrie and Mr. William Cash, Jnr., be re-appointed Auditors of the Company to hold office until the next Annual General Meeting, and that the total remuneration paid to them be such a sum as after deducting income-tax for the time being chargeable thereon shall be equivalent to a net rate of £450 per annum.

Mr. WILLIAM CASH, Jnr., acknowledged, on behalf of himself and Mr. E. Knowles Corrie, this renewal of the proprietors' confidence in them.

Votes of Thanks.

Mr. F. R. W. SLY moved that the thanks of the meeting be given to the Chairman and Directors for their management of the business of the Company during the past year. In doing so he expressed pleasure at seeing a younger element on the Board.

The resolution was seconded by Capt. W. J. LIBERTY and cordially agreed.

The CHAIRMAN, in acknowledging the vote, remarked that theirs was an extremely pleasant Board to be on. Mr. Sly had recalled that the Board used to be a little elderly; but he thought that they were now rather well balanced. He was very much obliged to the proprietors for the resolution.

The Chairman went on to propose a hearty vote of thanks to the officers, staff, and workpeople of the Company. The officers, he said, were young men who had been brought up in the traditions of the Company. The whole of the staff worked together, as was indicated by the satisfactory results they were able to put before the meeting. The Directors could not do much without good officials and staff; they certainly had them and they were very grateful to them. The same applied to the workmen. The pension fund had been started on the centenary of the Company, and this had been a great help in keeping the men satisfied and happy. The Company were certainly served well by all their workmen, while they also thanked the ladies on the staff who assisted in the showrooms, by demonstrations, and by visiting consumers in their homes and teaching them the best way to use gas. They were very grateful to them all.

The DEPUTY-CHAIRMAN seconded the vote of thanks, which was heartily accorded; and Mr. SLY added a special vote to the heads of the various departments, who were, he said, the "engines" of the whole organization.

The SECRETARY, in responding on behalf of the officers, staff, and workpeople, thanked the meeting for the vote and the Chairman for the very cordial terms in which he had proposed it. It was especially pleasing, said Mr. Mumford, because he felt that all their staffs and workpeople had worked, and were working, extremely well, with that loyalty and care for the interests of the Company which had become a tradition of their service and which was fostered by the encouragement and consideration they always received from the Board. They would greatly appreciate this recognition of their efforts, and he would be very happy indeed to convey the vote to them.

The meeting terminated with a cordial expression of thanks to the Chairman on the proposition of Capt. LIBERTY.

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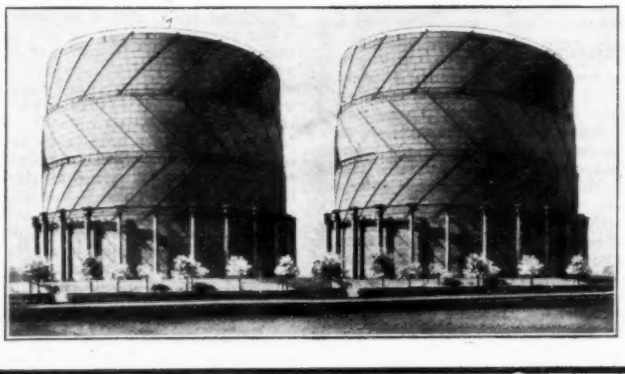

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Radiation Limited

Mr. H. James Yates' Speech at the Ordinary General Meeting

At the Annual Meeting of the Company held at The Incorporated Accountants' Hall, Victoria Embankment, London, on the 24th March, 1937, the Chairman, Mr. H. James Yates, said:—

You will see from the copies of the Report and Accounts for 1936, which you have received, that the Accounts are set out in a form similar to that of previous years and include the Combined Statement of the Assets and Liabilities of the Subsidiary Companies.

No doubt you have already considered the Report and Accounts but before formally proposing their adoption I should like to refer briefly to certain items and also to give you some indication of the nature and extent of our activities.

Firstly in regard to the Accounts and the Combined Statement, if you will look at the Profit and Loss Account set out on pages 4 and 5 you will see that the net income from the Subsidiary Companies for the year, together with Transfer Fees and Bank Interest, amounts to £328,974, as compared with £327,391 for 1935.

The total to the credit of Profit and Loss Account is £470,875, which includes the balance of £141,901, brought forward from 1935. It is considered advisable that the General Reserve be increased to £200,000, and for that purpose the sum of £34,857 12s. 0d. is transferred from the Profit and Loss Account. After deducting that transfer to Reserve and the amount of the Interim Dividends paid in October last, there remains to the credit of Profit and Loss Account the sum of £357,228, which is carried to the Balance Sheet. From that figure is reserved the amount for the proposed Final Dividends and Bonus, leaving the sum of £127,483, to be carried forward to next year. This compares with the amount of £141,901 brought forward from 1935, the reduction in the carry forward figure being caused by the transfer to General Reserve.

The principal items on the Assets side of the Radiation Balance Sheet are £2,392,675, the cost to Radiation of investments in Subsidiary Companies, and £1,437,731, the amounts owing by these Companies; the latter item includes:—

> The Dividends declared for 1936 by the Subsidiary Companies; Balance of Dividends of past years; and
> Charges to the Subsidiary Companies for amounts paid by Radiation in the first instance on behalf of these Companies.

I do not think that any of the other items in the Radiation Balance Sheet call for comment.

I will now turn to the Combined Statement of the Assets and Liabilities of the Subsidiary Companies, shown on pages 6 and 7 of the Accounts.

Dealing first with the Assets side, you will see that—of the Fixed Assets—Land and Buildings now amount to £794,968, and Plant and Machinery to £357,017, making the total value of these Fixed Assets £1,151,985. That figure is arrived at after deducting provision for Depreciation and Obsolescence Reserve and shows an increase of £108,339 over the figure of a year ago.

Increase in trade during the year 1936, and the consequent necessity for carrying larger Stocks, explains the considerable increase of £239,558 in Stocks and Debtors. This increase in trade is also reflected in other items and it will be noticed that there is a reduction of £125,470 in Cash Balances and Investments and an increase of £102,377 in Creditors.

Turning now to the other side of the Combined Statement, there is a slight reduction in the liability for Debentures in a Subsidiary Company. I may mention that steps have been taken to redeem the whole of these outstanding Debentures during the present year.

The second item—Sundry Creditors—shows an increase, and I have already referred to this in connection with increased trade.

The next two items, totalling £3,830,406, namely, the cost to Radiation of Investments in Subsidiary Companies and amounts owing to Radiation by those Companies, correspond to the first two items shown on the Assets side of the Radiation Balance Sheet, and I have already mentioned those items.

The last item is the balance to the credit of Profit and Loss Accounts of the Subsidiary Companies amounting to £450,871, as compared with £343,569 at December 1935.

Competition and Manufacturing Costs.

Two points stand out in reviewing the trading conditions experienced in 1936. One of these is the severe competition and the other is the higher manufacturing costs occasioned by advances in wages and increases in prices for raw materials. Because of these difficulties we have not been able to maintain the same rate of profit on our sales as in previous years, but our turnover has constituted a new high record so that, despite the lower rate of profit on sales, we are able to report an increase in the amount of Net Profit for the year. Considerable extensions were made to Buildings and Plant during the past year, which enabled the Company to meet the additional demand for its products.

There is little doubt that the trading conditions which prevailed last year will continue during the present year, but we have ample resources available and we shall use them in order to keep the Company in a position to meet whatever conditions arise.

As I have just said, during the past year we had to face increases in costs of wages and of raw materials. A year ago I also made reference to the rising costs. Wherever possible in contracting for our raw materials we endeavour to cover our requirements for the ensuing twelve months, but circumstances, over which we have no control, prevented our doing this so fully as we had been able to do in previous years. Consequently our costs increased, and although we retained unaltered our selling prices for as long as possible, at a heavy sacrifice to ourselves, we were reluctantly compelled on the 1st December last to increase our prices, but we did so only by a small percentage, which has not covered our higher costs of raw materials and increased cost of labour. We are now faced with further increases in wages, also the contracts we have made for our raw materials are on a higher price basis, and, owing to conditions of which you are all aware, it is increasingly difficult to obtain delivery.

Competition continues to increase, but with our very large resources we are keeping well ahead, as we always do, with further developments in all our apparatus. We again applied for a number of Patents last year, not only in this country but abroad, to protect the results of our costly Research and development work.

At Radiation House we continue to carry on pure Research work, as it is by the acquiring of knowledge which can only be gained by such work that we are able to ensure progressive development in the future.

As soon as any investigation has passed the theoretical stage and requires practical development, the work is then transferred to our laboratories in Birmingham, where we have during the past year built entirely new laboratories on even a larger scale than those we had previously, and I can say with confidence they are the finest and best equipped laboratories in the gas appliance industry in this country.

We have some forty-five chemists and physicists who devote themselves to the study of the problems involved in the design, manufacture and use of the many types of Radiation apparatus.

The Gas Industry has the confidence of the public and it behoves us as the largest manufacturers of gas-consuming apparatus in this country to ensure the maintenance of a high quality, both of design and workmanship, and to add to the common pool our findings on technical matters of which we have special experience.

Imperative Hygienic Standard.

At all times we must keep before us the imperative necessity for a hygienic standard. It is about ten years since we drew the attention of the Gas Industry to the desirability of adopting a combustion standard, for it was in 1927 that we published the brochure "Hygienic Standard of Gas Apparatus." To-day no maker of repute would willingly supply a piece of apparatus which did not satisfy the very high combustion standards adopted by common consent in the Gas Industry.

It is now realized that a Gas Fire provides means of quickly and healthily warming a room and this has only been attained by our inventions and developments applied to gas fires. In 1908 we were the first to introduce the vertical columnar radiant: this has gradually been developed until we introduced a few years ago our High Beam Gas Fire with both columnar and scrubber radiants, which give an increased radiant efficiency and enable us to make the whole of the fire opening aglow with warmth. The sales of our High Beam Fires again reached a record figure during the past year, and our introduction, several years ago, of the self-lighting tap, which does away with the need to use matches, has been the means of greatly extending the use of gas fires.

I will not trouble you again with the details of our long and original Research into the value of the short infra-red rays from the health point of view. Our linking of the quality of radiant heat with comfort has appealed not only to the Gas Industry in this country, but to the fellow industries on the Continent and in America. To emphasise the importance of this Research, we recently published in the Press photographs of gas fires showing pictorially the emission of short infra-red rays. These photographs are remarkable and have demonstrated the advance made by the construction of High Beam Gas Fires.

Turning to another aspect of your business, namely, matters connected with cooking, I may remark that the subject of Dietetics is not sufficiently studied. Both good food and good cooking are essential to maintain us in good health. Nutritious food does not always mean costly food; some of the simplest things can be served in such a way as to be most appetising and frequently an enjoyable meal can be made from very little material. Good cooking has not always been a strong point in this country, but things have changed very much in recent years, and I think Radiation can take credit for having done a great deal to this end.

The success resulting from the work done in our Research and Demonstration Kitchen at Radiation House has led us to rebuild and equip a much larger Kitchen in Birmingham, enabling us to extend our School of Cookery where we train many women who, so soon as they are expert in their work, go all over the country lecturing and giving practical demon-

strations which have been much appreciated by many thousands of housewives.

We have on our staff specially-trained people for the study of dietetics, as it is important to ensure that cooked foods shall have the highest nutritive value possible. For this class of work chemical specialists are needed since recent advances in chemical research have led to the development of methods whereby vitamins and certain of the amino acids can be estimated by chemical as well as by biological methods, thus enabling the estimation of vitamins in foodstuffs to be applied over a much wider field than hitherto. The knowledge and experience gained by specialists can then be translated as far as possible into the requirements of everyday life.

Our Research Kitchens continue to be visited by Cookery Classes from all over the country, and even from abroad.

The demand for our " New World " Cookers during the past year again constituted a further record. We have millions of satisfied users, and it is indeed pleasing to us to continue to receive numerous letters of appreciation testifying that the " New World " Cooker is ahead of all others.

I have on a number of occasions spoken to you about the " Regulo " on our gas cookers, which is our own type of thermostat, invented many years ago and brought by us to a very high state of perfection. The name " Regulo " has been so widely advertised all over the world that it has become a household word and is thought by many to refer to any thermostat used with a gas oven. The word " Regulo " is our Registered Trade Mark and refers to the specially designed thermostat supplied only with Radiation cookers. While it is a great compliment that other thermostats should be referred to by that name, it is important that the public should realise there is only one " Regulo " and that is obtainable only with Radiation Gas Cookers, and is marked with our Trade Mark " Regulo."

The novice in cooking has nothing to fear when using the " New World " Cooker with " Regulo," with the help of the Radiation Cookery Book; and more experienced cooks have the satisfaction of knowing that their successful results can be repeated with certainty from day to day.

The Radiation Cookery Book is now in its Twentieth Edition and over one million copies have been sold. To give you some idea of what this really means, I told you last year that the paper used for the book, if placed in reams, would form a column nearly five times as high as St. Paul's Cathedral. The height would now be more than six times the height of St. Paul's.

Year by year, as a result of our work in the Radiation Kitchens, we continue to improve and add to the recipes in our Cookery Book. It is fast becoming a household book and we are constantly being told what a great help it is, containing as it does a variety of menus which are not expensive to prepare and yet contain the vitamins which are so necessary to ensure good health.

In addition to the Radiation Cookery Book we have compiled and issued a considerable number of smaller booklets, many of them containing illustrations, which have proved to be both helpful and popular. These have been prepared to help users to make the most of their " New World " Cookers by having at hand, in convenient form, selections of recipes for various occasions.

Throughout the past year we have continued to emphasise in our advertisements the valuable features of the various types of Radiation Apparatus. Our expenditure in this direction increases year by year, but widespread and systematic advertising is a necessary feature of all large and progressive business concerns.

I will now refer to a matter which I am sure will be of special interest to you.

Pension and Life Assurance Scheme.

We are about to introduce a Pension and Life Assurance Scheme for the benefit of the Staff Employees of our Companies.

The Scheme is a contributory one, in the sense that both Employer and Employee contribute towards its cost. It provides for a life pension at the age of 65 in the case of men, and at 60 in the case of women. The pension will be guaranteed for a minimum period of 5 years, so that in the event of the death of a pensioner within the 5 year period, the pension would continue and be paid to his dependants for the remainder of that period. The Scheme is so arranged that the amount of the pension varies with the number of years of service and the remuneration paid.

The Scheme also makes provision for payment of a capital sum by way of Life Assurance in the case where an employee dies before the age of retirement and while in our service. There is provision also for payment of benefit to an employee who may become permanently and totally disabled before the age of retirement.

We have a number of employees on the Staffs of our Constituent Companies who have already many years of service to their credit, including a number who are nearing pension age. For such employees we are making special provision for pensions payable to them according to their number of years past service.

Our Pension Scheme will be effected through one of the leading Insurance Companies in this country, and the Insurance Company alone will be responsible for payment of the pensions

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and other benefits. Our obligation will be limited to the payment year by year of our proportion of the annual premium.

It has always been our custom to make allowances on the retirement of our old servants, on account either of ill-health or old age, but the new Scheme provides definite known benefits for employees. The yearly charge for the Pension Scheme will be a substantial one, but even so it is not greater than the ultimate cost of continuing to pay allowances or gratuities on the present basis to our old servants who retire after spending many years in our service.

There are other provisions in the Scheme for dealing with various circumstances but I need not now refer to them in detail. As a whole, the Scheme follows on the lines which are now well recognised as being sound, fair and reasonable. I have no doubt that it will be of advantage to all concerned.

Conversion of Shares to Stock.

We are placing before you to-day a Resolution for the conversion of our issued and fully paid Preference and Ordinary Shares into Preference and Ordinary Stock respectively. The stock will be transferable in units of One Pound or multiples thereof, and will carry exactly the same rights as to dividends, voting, and otherwise as the shares. To the shareholders, therefore, the proposed conversion has no particular significance, but it will assist us to effect economies in dealing with Share Transfers.

Each share, as you all know, has a distinctive number, and these numbers must necessarily be used on transfers, on Share Certificates, and in the Company's Register and books whenever any shares are dealt with. This entails considerable clerical labour and time, also expense.

It was thought at one time that the use of distinctive numbers afforded to the Shareholder and to the Company some measure of protection against fraud or error, but this has not been borne out by experience, and it is now the common practice to convert the shares into stock, which can be done when the shares are fully paid.

It is not necessary for shareholders to send in their existing share certificates in order that they may be exchanged for stock certificates. In fact, if shareholders were to do so, it would involve a large amount of unnecessary clerical work, with no advantage.

The procedure will be that as share certificates are sent to the Company on the occasion of transfer, registration or probate, or other like transaction, they will be retained and cancelled, and stock certificates will be issued in their place. In the meantime, the existing share certificates will be good delivery for an equivalent amount of stock.

I am sure you will be in agreement with this Resolution, and we are immediately taking the necessary steps to get the formalities through with the Stock Exchange.

Once again it is my pleasure to place on record our sincere appreciation of the loyal support of all those in the service of the Company. It is the loyalty of all employed by the Company giving forth their best efforts that so greatly helps to ensure full employment in all our Works.

I have pleasure in moving:—

"That the Directors' Report and Accounts for the year "ended 31st December, 1936, as presented by the Directors, "be received and adopted, and that Final Dividends and "Bonus be declared as follows:—3 per cent., less Income "Tax, for the half-year to 31st December, 1936, on the "6 per cent. Cumulative Preference Shares; 9⅜ per cent., "less Income Tax, on the Ordinary Shares, making, with "the Interim Dividend, a total Dividend of 12½ per cent. on "the Ordinary Shares for the year; and a Bonus on the "Ordinary Shares of 2½ per cent., less Income Tax."

Gas Undertakings' Results

Brisbane.

The Brisbane Gas Company reports that the half-yearly statement of accounts shows a net amount to credit of profit and loss (inclusive of balance from last half-year) of £25,415. A dividend of 3¼% is recommended, amounting to £24,578, leaving to be carried forward £837. The sales of gas for the half-year show a satisfactory increase over the corresponding half-year of 1935, the increase in quantity sold being nearly 3%.

Yorktown (Associated Gas and Water).

The gross profit for the year in respect of the combined undertaking of the Yorktown (Camberley) and District Gas and Electricity Company amounts to £24,309, and the profit and loss account shows that after providing for debenture and other interests, dividends on preference stock for the year 1936, and the dividend at the rate of 6¼% per annum, less tax, on the consolidated ordinary stock for the half-year to June 30, 1936, there is a balance of £14,892 available for dividends. The Directors recommended that dividends at the following rates be declared for the half-year ended Dec. 31, 1936: 5% per annum on the consolidated preference stock, and 6½% per annum on the consolidated ordinary stock, both less income-tax. The ordinary dividend will absorb £3,184 in addition to the preference dividend already provided for, leaving £11,708 to be carried forward to the next account. The business of the Company continues to be satisfactory, gas sales showing an increase of 4·39% over 1935.

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3	—
4	4
6	6
7	7
8	8
9	9
10	10
12	12

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9 Feet Lengths	12 Feet Lengths
DIAMETER	DIAMETER
ins.	ins.
3	—
4	4
6	6
8	8
9	9
10	10
12	12
	15
	18
	24

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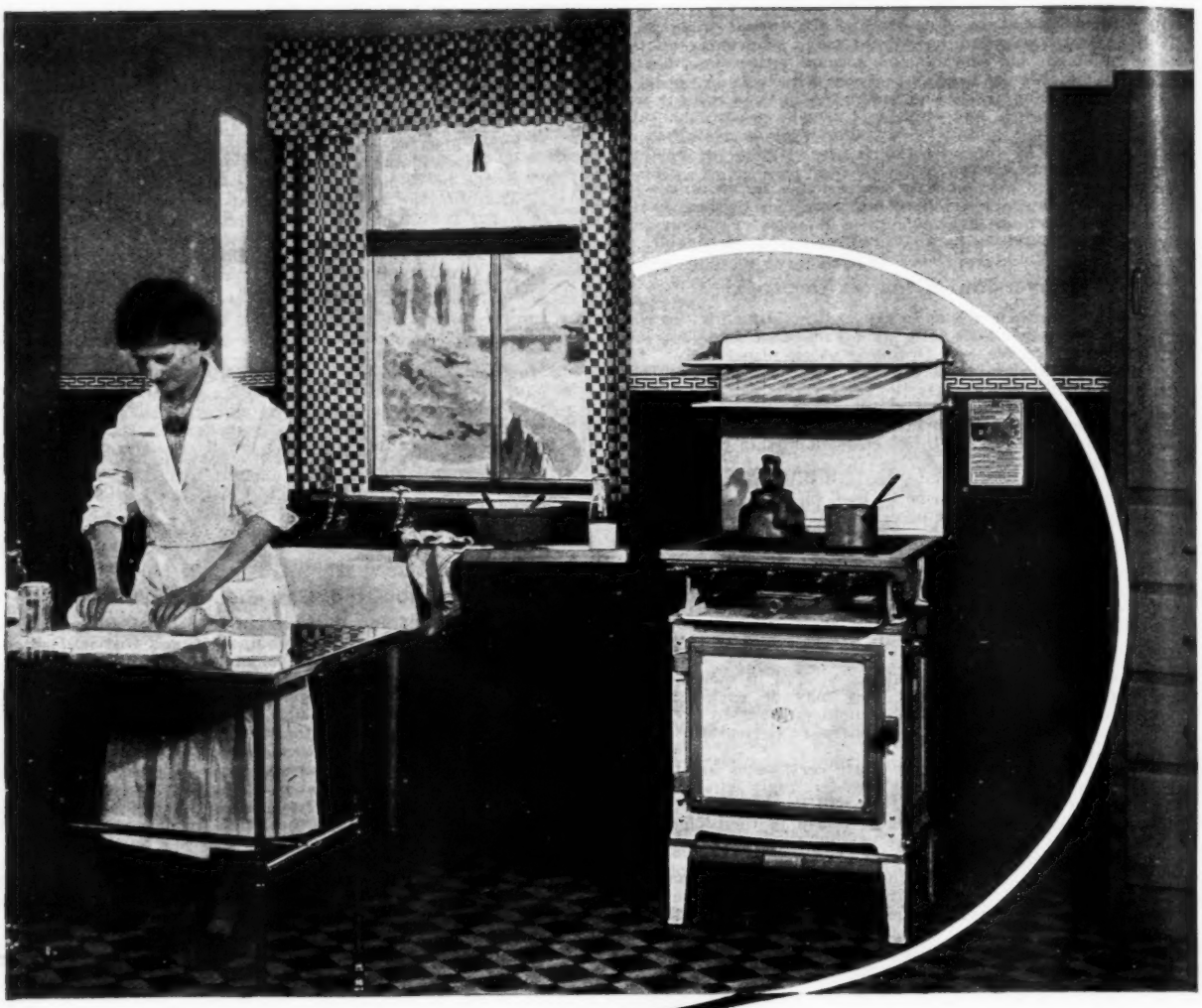

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

Despite the near approach of the holidays, business on the Stock Exchange last week after a quiet opening became quite brisk. Gilt-edged and other high-class securities were in good demand and prices began to harden, while home rails were firmer in anticipation of good Easter traffic returns. Oils and mines were dull at the commencement by reason of heavy liquidation on French account, though a subsequent recovery took place on the cessation of this movement, and oils particularly made a good show. Copper shares were stimulated by the higher price of the commodity, but rubbers, though continuing in good demand, became somewhat irregular on reports of labour troubles in Singapore.

The Gas Market was quiet and featureless, and only a small volume of business was transacted. Practically all quotations closed unchanged, and, with the exception of the rise of 3d. in Gas Light units, there was still no sign of the recovery noticeable in similar class securities in other sections percolating to this market.

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *March* 30.

There is little of interest to record in the London Tar Products market, to-day's prices being as follows:

Pitch, 36s. to 37s. per ton f.o.b.
Creosote, 5⅜d. to 6d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 8s. 6d.; all per gallon naked at makers' works.

Tar Products in the Provinces.

March 29.

The average prices of gas-works products during the week were: Gas-works tar, 21s. 6d. to 26s. 6d. Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar crude naphtha, in bulk, North, 8½d. to 8⅝d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5⅛d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 10d. to 2s. 11d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a s. value at any port it will be necessary to deduc t the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *March* 27.

Business continues quite brisk with prices of all products firm and inclined to rise.

Crude gas-works tar.—The actual value is 36s. to 37s. per ton *ex* works in bulk.

Pitch continues rather disappointing at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is being quoted for delivery over the season at 3d. to 3¼d. per gallon, free on rails for export, and 3¾d. to 4d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—There is a renewed activity in this product and prices are not lower than the following: Specification oil, 5½d. to 5⅝d. per gallon; low gravity, 5¾d. to 6d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—With demand continuing strong values show a further appreciation. Pale, 97/99%, 4s. to 4s. 2d. per gallon; dark, 97/99%, 3s. 9d. to 3s. 11d. per gallon; and pale, 99/100%, 4s. 5d. to 4s. 8d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is unchanged at 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—Prices are steady with 90/160 grade at 1s. 4d. to 1s. 5d. per gallon and 90/190 heavy naphtha at 11d. to 1s. per gallon.

Motor benzole is available at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Prices are nominal at 6s. 6d. to 7s. 6d. per gallon for 90/160 grade, and 7s. 6d. to 8s. 6d. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9½	to	0 10	per gallon at works
Motor ,,	1 3	,,	1 3½	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 8	,,	1 8½	,, ,, ,,

Contracts Advertised To-Day

Boosting Plant.

Brighouse Gas Department. [p. 860.]

Coal.

Carlisle Gas Department. [p. 860.]
Morley Gas Department. [p. 860.]

Handling Shovel.

Wallasey Gas and Water Department. [p. 860.]

Retorts, &c.

Brighouse Gas Department. [p. 860.]

Further Gas Undertakings' Results

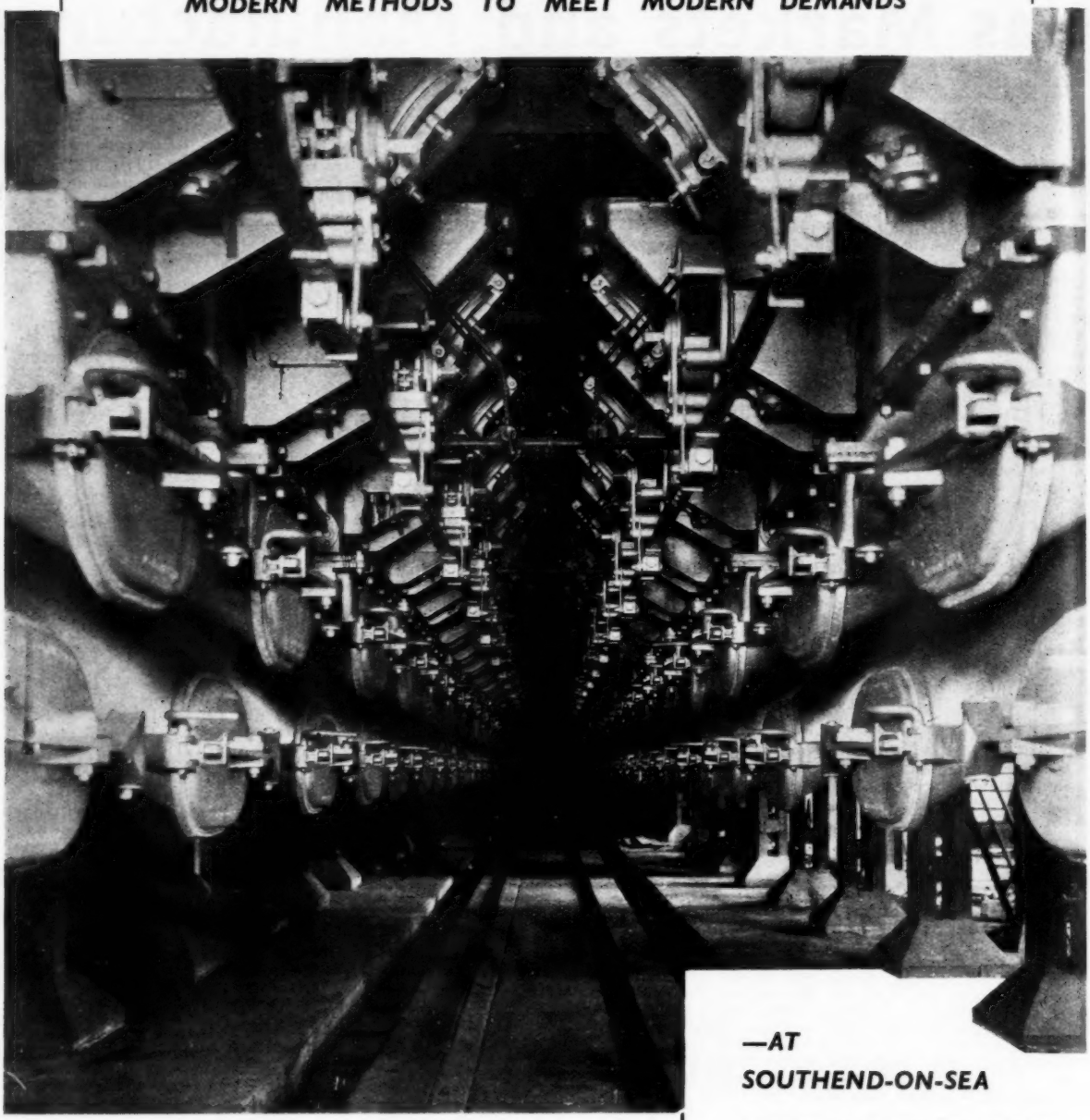
Haywards Heath (Associated Gas and Water).

Increased sales and profit, as compared with the previous year, were features of the report and balance-sheet submitted to the proprietors at the annual meeting of the Haywards Heath District Gas Company. Mr. W. H. Bennett (Chairman of the Board of Directors) presided, and he was supported by Messrs. W. Lees Stenning, J. H. Donaldson, J. Urquhart (Directors), and Mr. A. E. Whitcher (Director and Secretary). The report stated that the sale of gas showed an increase of 2·61% for the year as compared with 1935. The Directors recommended a final dividend at the rate of 10% on the 5% consolidated stock for the half-year to Dec. 31, 1936, making 9%, less income-tax, for the year. This would absorb the sum of £1,833, leaving a balance of £5,006 to be carried forward. The Chairman, in moving the adoption of the report and statement of accounts, said the year had been another of steady but definite progress in all departments. The output of gas now exceeded 150 million cu.ft. per annum. It was interesting to note that 19 additional street lamps had recently been added to the existing number of 343 public gas lamps in the Company's area of supply. All the Council housing schemes provided for the exclusive use of gas for lighting, heating, and cooking, and as these schemes had extended over several years it must be considered a testimonial to the service given by the Company.

Prescot (United Kingdom).

The report of the Directors of the Prescot Gas Company for the year ended Dec. 31, 1936, states that the amount available for dividend is £6,512. In addition to the interim dividends (subject to income-tax), for the half-year ended June 30 last and paid on Sept. 1, 1936, the Directors recommend that the following dividends (subject to income-tax), for the half-year ended Dec. 31, 1936, be declared—viz.: On £4,510 preference "C" stock at the rate of 4% per annum, on £8,420 preference "C" stock at the rate of 4½% per annum, on £3,070 preference "C" stock at the rate of 5% per annum, on 17,000 consolidated ordinary shares at the rate of 5% per annum, on £7,500 preference "C" stock, 1935, at the rate of 4½% per annum, on £18,100 preference shares at the rate of 6% per annum, amounting to £2,986, which will leave a balance to the credit of revenue account of £3,525. The rapid growth of housing estates in the district has necessitated the laying of nearly four miles of new mains during the past year. The make of gas was 117,839,000 cu.ft. compared with 112,537,000 cu.ft. and a proportionate increase was shown in the quantity of gas sold. Consumers increased from 4,953 to 5,530 during the same period.

MODERN METHODS TO MEET MODERN DEMANDS



—AT SOUTHEND-ON-SEA

Installation of Glover-West vertical retorts which has now begun regular service at the Southend-on-Sea Station of the Gas Light and Coke Company (London). A view below the retort bench showing coke extractors, coke discharging mouthpieces and West lip bucket conveyors.

405 West-built carbonizing plants erected totalling **10,556** retorts and chambers with a nominal daily make of **579** million c.ft.

THE WEST SYSTEMS

GLOVER-WEST VERTICAL RETORTS ● WESTVERTICAL CARBONIZING CHAMBERS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C. 2 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

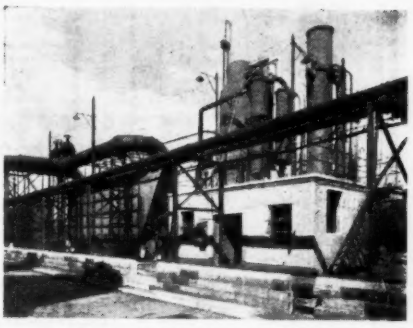
Issued £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Mar. 24.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	162—167*	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	96—101	...	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	—5	...
300,000	1	Oct. 5	1.9⅞	1/4⅛	Bombay, Ltd.	26/—28/-	...	...
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	163—168	...	163
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	80—85	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	140—145	...	141
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	130—135	...	...
855,000	,,	Mar. 1	7	8	British Ord.	150—155	...	152
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	143—148	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1⅛—3⅛	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	120—125	...	...
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Oct. 19	2/-	2/-	Colombo Ord.	1⅞—1⅞	...	...
24,510	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-*	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	90⅛—92
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	73—78	...	75⅛
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	116—118
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	147—152	...	149—152
644,590	,,	,,	5	5	Do. max. div.	109—114	...	111⅛—112
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	115—120	...	...
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c.... ...	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5.p.c. ...	122—127	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	Nov. 16	6	4	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Feb. 1	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	23 6—24/6a	+-/3	23 9—24/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	75—80	...	78—79
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	96—101	—1	99½—100⅛
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb. ...	78—81	...	78⅛—79⅛
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	110⅛—111⅛
3,500,000	,,	,,	4⅛	4⅛	Do. 4⅛ p.c. Red. Deb....	108—111	...	109⅜
700,000	,,	Mar. 1	25/5⅛	3½	Do. 3½ p.c. Red. Deb....	96—101	...	100
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	125—130	...	...
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	157—162	...	158—160
223,130	,,	Feb. 1	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	90—95	...	90⅛—91½
285,242	,,	Mar. 1	8⅛	8⅛	Lea Bridge 5 p.c. Ord. ...	165—170	...	...
11,751	,,	Mar. 1	8	10	Maidstone Gas 5 p.c. Cap. Stk.	180—190	...	...
63,480	,,	Dec. 14	3	3	Do. 3 p.c.Prp.Db.Sk.	72—77	...	...
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ...	150—160	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	...
360,075	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	Jan. 4	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	97—100	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	80—85	...	83—83¾
250,000	,,	Feb. 15	7½	7½	North Middlesex 6 p.c. Con.	160—165	...	...
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	,,	Nov. 2	†7	†9	Oriental, Ltd....	165—170	...	...
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	170—175	...	...
621,667	,,	Feb. 15	8½	8½	Portsmouth & Gosport Cons.	170—175	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	...
73,350	,,	,,	5	5	Do. 5 p.c. Pref. ...	112—117	...	...
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	20/—22/-	...	20/3—21/-
454,510	1	Mar. 15	-/10⅛	-/10⅛	,, ,, 4½ p.c. Cum. Pref.	20/—22/-*	...	...
133,201	Stk.	Feb. 15	5	8⅛	Shrewsbury 5 p.c. Ord. ...	133—138	...	...
90,000	10	June 8	13⅓	14	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2⅝	1/2⅝	South East'n Gas. Cn.Ld. Ord.	24-/—26/-	...	...
845,511	1	Mar. 1	-/10⅛	-/10⅛	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	...
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	19/6—21/6	...	19/6
450,000	,,	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	...
150,000	Stk.	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—112	...	108—109½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	131—136	...	131½—133½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	96—101	...	...
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	73—78	...	76
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	107—112	...	...
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	125
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	115—120	...	117½
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—103	...	...
427,859	1	Nov. 16	1/2⅜	9⅜	S. Western Gas & Water Ord.	20/—22/-	...	...
160,523	1	Oct. 19	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pf.	20/6—22/6	...	...
110,000	Stk.	Dec. 14	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
750,541	,,	Feb. 1	5	5½	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	98—103	...	...
350,000	,,	Feb. 15	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
106,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Feb. 15	6⅝	6⅝	Tottenham and District Ord.	137—142	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref....	123—128	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	98—103	...	98
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	142—147	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	142—147	...	143—145
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	113—118	...	115—117
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	95—100	—1	96—98
1,343,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	145¼—146½
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	123—128	...	...
200,000	,,	Dec 14	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

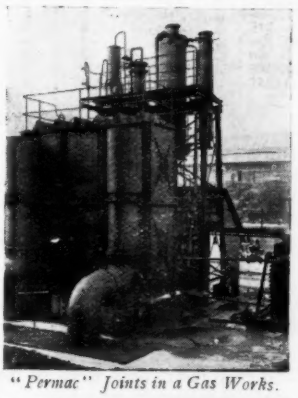
Stock and Share List continued overleaf.

First came "Permac"!

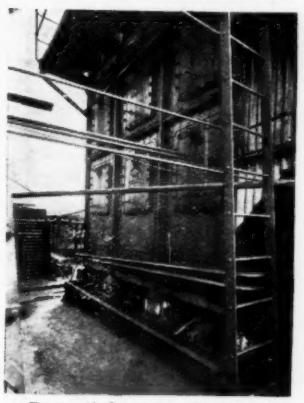
(the ***original*** *metal-to-metal Jointing)*



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Cheap imitations are ever appearing. Do not be misled! "Permac" has been manufactured *solely* by Thomas & Bishop Ltd. since 1915 Its unaltering worth is *proved* every day in Gas Works all over the country.

Permac
METAL-TO-METAL JOINTING MATERIAL

Obtainable only from:

THOMAS & BISHOP LTD
37, Tabernacle St.
LONDON, E.C. 2

STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Mar. 24.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 1	5	6	Bath Cons.	121—123	...	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	115—118	...	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	108—112	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13 —14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	Dec. 14	4½	4	Do. 4 p.c. Pref.	98—102	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	123—124	...	...
245,500	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref. ...	101—106	...	...
306,083	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	103—105	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Co. & New	125—127	...	...
2,061,315	,,	Feb. 1	5	5¼	Newcastle & Gateshead Con.	23 9—24 3*d*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	95—96	...	...
776,706	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	95—100	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	160—180	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	144—146	...	...
95,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	101—104	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-*b*	25/-*b*	Ascot Ord.	102—107*	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	110—115	...	...
312,083	1	Nov. 16	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	20/6
150,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100*	...	...
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	140—145	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	200—210	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	142—147	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	102—107	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	134
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115*	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	190—200	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	150—160	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	200—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137*	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120*	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	165—175	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142*	...	...
21,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—22/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6*	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	135—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	113—118	...	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120	...	...
750,000	1	Oct. 5	5·52d.*a*	4	Utd. Kingdom Gas Cpn. Ord.	20/—22/-	...	21/—21/6
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	21/3
674,084	1	Oct. 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pref.... ...	19/—21/-	-1/-	...
600,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101*	...	...
130,000	,,	Feb. 15	5	8	Wakefield Ord.	137—142	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	110—115	...	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
‡133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c ons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	125—130	...	...

a The quotation is per £1 of Stock. *b* Actual for Quarter. * Ex div.

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PART VII.

of

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Officer-in Charge of Training, The Gas Light and Coke Company, Assistant Head of Department of Gas Engineering and Supply, Westminster Technical Institute.

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